U.S. DEPARTMENT OF COMMERCE
National Technical Information Service

PB-247 307

ECONOMIC ANALYSIS OF EFFLUENT GUIDELINES FOR SEAFOOD PROCESSING INDUSTRY

(FISH MEAL, SALMON, BOTTOM FISH, CLAMS, OYSTERS, SARDINES, SCALLOPS, HERRING, ABALONE)

DEVELOPMENT PLANNING AND RESEARCH ASSOCIATES, INCORPORATED

PREPARED FOR
ENVIRONMENTAL PROTECTION AGENCY

OCTOBER 1975

KEEP UP TO DATE

Between the time you ordered this report—which is only one of the hundreds of thousands in the NTIS information collection available to you—and the time you are reading this message, several *new* reports relevant to your interests probably have entered the collection.

Subscribe to the **Weekly Government Abstracts** series that will bring you summaries of new reports *as soon as they are received by NTIS* from the originators of the research. The WGA's are an NTIS weekly newsletter service covering the most recent research findings in 25 areas of industrial, technological, and sociological interest—invaluable information for executives and professionals who must keep up to date.

The executive and professional information service provided by NTIS in the **Weekly Government Abstracts** newsletters will give you thorough and comprehensive coverage of government-conducted or sponsored research activities. And you'll get this important information within two weeks of the time it's released by originating agencies.

WGA newsletters are computer produced and electronically photocomposed to slash the time gap between the release of a report and its availability. You can learn about technical innovations immediately—and use them in the most meaningful and productive ways possible for your organization. Please request NTIS-PR-205/PCW for more information.

The weekly newsletter series will keep you current. But *learn what you have missed in the past* by ordering a computer **NTISearch** of all the research reports in your area of interest, dating as far back as 1964, if you wish. Please request NTIS-PR-186/PCN for more information.

WRITE: Managing Editor
5285 Port Royal Road
Springfield, VA 22161

Keep Up To Date With SRIM

SRIM (Selected Research in Microfiche) provides you with regular, automatic distribution of the complete texts of NTIS research reports *only* in the subject areas you select. SRIM covers almost all Government research reports by subject area and/or the originating Federal or local government agency. You may subscribe by any category or subcategory of our WGA **(Weekly Government Abstracts)** or **Government Reports Announcements and Index** categories, or to the reports issued by a particular agency such as the Department of Defense, Federal Energy Administration, or Environmental Protection Agency. Other options that will give you greater selectivity are available on request.

The cost of SRIM service is only 45¢ domestic (60¢ foreign) for each complete microfiched report. Your SRIM service begins as soon as your order is received and processed and you will receive biweekly shipments thereafter. If you wish, your service will be backdated to furnish you microfiche of reports issued earlier.

Because of contractual arrangements with several Special Technology Groups, not all NTIS reports are distributed in the SRIM program. You will receive a notice in your microfiche shipments identifying the exceptionally priced reports not available through SRIM.

A deposit account with NTIS is required before this service can be initiated. If you have specific questions concerning this service, please call (703) 451-1558, or write NTIS, attention SRIM Product Manager.

This information product distributed by

NTIS U.S. DEPARTMENT OF COMMERCE
National Technical Information Service
5285 Port Royal Road
Springfield, Virginia 22161

346053

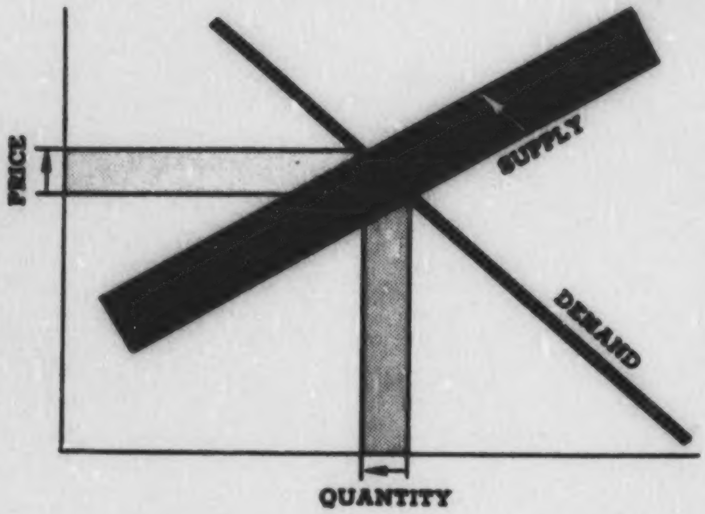
EPA-230/2-74-047
October, 1975

PB 247 307

ECONOMIC ANALYSIS
OF
EFFLUENT GUIDELINES

SEAFOOD PROCESSING INDUSTRY

FISH MEAL, SALMON, BOTTOM FISH, CLAMS, OYSTERS, SARDINES, SCALLOPS, HERRING, ABALONE



Reproduced by
NATIONAL TECHNICAL
INFORMATION SERVICE
US Department of Commerce
Springfield, VA. 22151

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Planning and Evaluation
Washington, D.C. 20460

BIBLIOGRAPHIC DATA SHEET

1. Report No. EPA-230/2-74-047

2.

3. Recipient's Accession No. PB 247 307

4. Title and Subtitle

Economic Analysis of Effluent Guidelines
Seafood Processing Industry, Fish Meal, Salmon, Bottom Fish
Clams, Oysters, Sardines, Scallops, Herring, Abalone

5. Report Date

October 1975

6.

7. Author(s)

David L. Jordening, Thomas R. Eyestone

8. Performing Organization Rept. No. 135

9. Performing Organization Name and Address

Development Planning and Research Associates, Inc.
P. O. Box 727
Manhattan, Kansas 66502

10. Project/Task/Work Unit No.

Task Order No. 11

11. Contract/Grant No.

68-01-1533

12. Sponsoring Organization Name and Address

Environmental Protection Agency
Office of Planning and Evaluation

4th and M. Streets, S. W.
Washington, D. C. 20460

13. Type of Report & Period Covered

Final Report

14.

15. Supplementary Notes

16. Abstracts

The U.S. seafood processing industry is highly diverse in terms of products and dispersed in terms of geographic location extending from Alaska to Maine. This report was concerned with the impact of effluent guidelines on processors of fish meal, salmon, bottom fish, clams, oysters, sardines, scallops, herring and abalone. A previous study dealt with tuna, shrimp, crab and catfish. The seafood industry studied is characterized by a large number of small plants, decreases in the number of plants over time and important competition from foreign producers. Economies of scale exist, both in processing and in effluent treatment. Opportunities to pass through increased costs due to pollution control to the consumer are limited.

Impacts, in terms of plant closures, will be greatest in the Alaskan salmon industry, non-mechanized bottom fish processing, non-mechanized clam processing and the West Coast oyster industry. Out of a total of 381 plants above cut-off levels, it is estimated that BPT guidelines would close 42 plants and BAT guidelines would close an additional

17. Key Words and Document Analysis. 17a. Descriptors

Pollution, water pollution, industrial wastes, fisheries, seafoods, economics, economic analysis, supply, price, variable costs, fixed costs, fixed investment, discounted cash flow, fish meal, salmon, bottom fish, clams, oysters, sardines, scallops, herring, abalone.

17b. Identifiers/Open-Ended Terms

05 Behavioral and Social Sciences, C-Economics
06 Biological and Medical Sciences, H - Food

17c. COSATI Field/Group

PRICES SUBJECT TO CHANGE

18. Availability Statement

National Technical Information Service
Springfield, Virginia 22151

19. Security Class (This Report) UNCLASSIFIED

20. Security Class (This Page) UNCLASSIFIED

21. No. of Pages 180

22. Price $7.50

FORM NTIS-35 (REV. 3-72)

[illegible]

16. Continued

86 plants. The production impacts would be minimal since most of the closures would be small plants and remaining plants have excess capacity. Good reemployment opportunities exist and net unemployment from BPT is estimated at 190 and from BPT + BAT at 510.

ECONOMIC ANALYSIS OF
EFFLUENT GUIDELINES
SEAFOOD PROCESSING INDUSTRY

Fish Meal, Salmon, Bottom Fish, Clams
Oysters, Sardines, Scallops, Herring, Abalone

David L. Jordening
Thomas R. Eyestone

To

Environmental Protection Agency

Contract No. 68-01-1533
Task Order No. 11
October, 1975

PREFACE

The attached document is a contractor's study prepared with the supervision and review of the Office of Planning and Evaluation of the U. S. Environmental Protection Agency (EPA). Its purpose is to provide a basis for evaluating the potential economic impact of effluent limitations guidelines and standards of performance established by EPA pursuant to sections 304(b) and 306 of the Federal Water Pollution Control Act.

The study supplements an EPA technical "Development Document" issued in conjunction with the promulgation of guidelines and standards for point sources within this industry category. The Development Document surveys existing and potential waste treatment and control methods and technologies within this category and presents the investment and operating costs associated with various control technologies. This study supplements that analysis by estimating the broader economic effects (including product price increases, continued viability of effected plants, employment, industry growth and foreign trade) of the required application of certain of these control technologies.

This study has been submitted in fulfillment of Contract No. 68-01-1533, Task No. 11 by Development Planning and Research Associates, Inc. Work was completed as of August, 1975. The study is based primarily upon an earlier study, also prepared by Development Planning and Research Associates, Inc. entitled "Economic Analysis of Interim Final Effluent Guidelines, Seafood Processing Industry."

The earlier report was circulated in conjunction with the publication in the Federal Register of a notice of proposed rulemaking under sections 304(b) and 306 for the subject point source category. The analysis contained in the original study has been revised based upon information received during the period of time between publication of the notice of proposed rulemaking and the promulgation of the final regulation. Because of the constraints of time, the control and treatment costs analyzed in this study may not in all instances be identical to those associated with the requirements of the promulgated regulation. However, those differences, when they exist, are minor insofar as the final conclusions of the study are concerned.

This report represents the conclusions of the contractors. It has been reviewed by the Office of Planning and Evaluation and approved for publication. Approval does not signify that the contents necessarily reflect the overall views of the Environmental Protection Agency. The study has been considered, together with the Development Document, information received in the form of public comments on the proposed regulation, and other materials in the establishment of final effluent limitations guidelines and standards of performance.

CONTENTS

Page

EXECUTIVE SUMMARY 1

I. INDUSTRY SEGMENTS I-1

A. Introduction I-1
B. Classification of Firms and Plants I-2
C. Economic Concentration in the Fisheries Industry I-5
D. Level of Integration I-6
E. Technological Status of the Industry I-6
F. Domestic Production, Imports and Exports I-7
G. Additional Characteristics I-12

II. FINANCIAL RETURNS AND FINANCIAL CHARACTERISTICS OF THE INDUSTRY II-1

A. General Considerations II-2
B. Constraints on Financing Additional Capital Assets II-3
C. Estimated Earnings and Financial Considerations by Segment II-3
D. Summary II-7

III. PRICING

A. Price Determination III-1
B. Potential Price Effects III-2

IV. ECONOMIC IMPACT METHODOLOGY IV-1

A. Fundamental Methodology IV-1

V. EFFLUENT CONTROL COSTS V-1

A. Description of Effluent Control Levels and Costs V-1
B. Current Status of Effluent Control in the Industry V-5

VI. IMPACT ANALYSIS VI-1

A. Total Investment Required under BPT and BAT VI-1
B. Price Effects VI-1
C. Financial Effects VI-10
D. Production Effects VI-10

CONTENTS (Continued)

Page

E. Employment Effects VI-18
F. Community Effects VI-22
G. Balance of Trade Effects VI-22
H. Impact of BAT Guidelines VI-23
I. Combined Impact BPT + BAT Guidelines VI-28
J. Impact of New Source Performance Standards VI-28

VII. LIMITS OF THE ANALYSIS VII-1

A. General Accuracy VII-1
B. Other Considerations VII-3
C. Selected Qualifications for Alaskan Segments VII-4

LIST OF TABLES

Table		Page
I-1	Distribution of plants by region: Bottom fish	I-14
I-2	Distribution of plants by region: Fresh & frozen salmon	I-15
I-3	Distribution of plants by region: Canned salmon	I-16
I-4	Distribution of plants by region: Oysters Pacific, fresh and frozen	I-17
I-5	Distribution of plants by region: Eastern oysters, fresh and frozen	I-18
I-6	Distribution of plants by region: Oysters Pacific, canned	I-19
I-7	Distribution of plants by region: Eastern oysters, canned	I-20
I-8	Distribution of plants by region: Clams, Frozen and fresh	I-21
I-9	Distribution of plants by region: Clams, canned	I-22
I-10	Distribution of plants by region: Fish Meal	I-23
I-11	Distribution of plants by region: Sea Herring, canned (Maine Sardines)	I-24
I-12	Summary of number of plants by select species	I-25
I-13	Geographic concentration of selected segments of the seafood processing industry	I-26
I-14	Number and size of U.S. seafood processing plants, 1970 and 1972	I-28
I-15	Concentration of fish and shellfish processing, 1972	I-29
I-16	Percent of total value of shipments accounted for by:	I-30
I-17	Number and size of U.S. canned sea herring processing plants, 1972	I-31
I-18	Number and size of U.S. fish meal processing plants, 1972	I-32
I-19	Number and size of U.S. Eastern Oysters fresh and frozen processing plants, 1972	I-33
I-20	Number and size of U.S. clams, fresh and frozen processing plants, 1972	I-34
I-21	Number and size of U.S. bottom fish processing plants, 1972	I-35
I-22	Economic concentration & integration of selected salmon processing companies	I-36
I-23	Oysters - Landings by region, 1964-1973	I-39
I-24	Oysters - processed product, United States, 1964-1972	I-40
I-25	Oysters, imports for consumption, 1963-1972	I-41
I-26	Clams - Landings by region, 1964-1973	I-42
I-27	Clams - processed product, United States, 1964-1972	I-43
I-28	Clams, imports for consumption, 1963-1972	I-44
I-29	Menhaden, U.S. landings by major states, and regions, 1963-1972	I-45
I-30	Production of menhaden products, 1947-71	I-46

LIST OF TABLES (Continued)

Table		Page
I-31	U.S. production of dried fish scrap and meal, solubles and manhaden oil, 1963-72	I-47
I-32	Foreign trade dried fish scrap and meal, solubles and fish and marine animal oil, 1963-1972	I-48
I-33	Anchovies - landings and processed product, California, 1964-1973	I-51
I-34	U.S. landings of Pacific salmon, by state, 1963-1972 (Round-weight)	I-52
I-35	U.S. salmon consumption, aggregate and per capita, canned and non-canned, 1963-1972 (Edible weight)	I-53
I-36	U.S. supply and disposition of salmon, 1963-1972	I-54
I-37	Imports of salmon to the United States, by country of origin, 1963-1972	I-55
I-38	U.S. canned salmon production, imports and exports, 1963-1972	I-56
I-39	Pacific bottom fish, landing and values by states, 1963-1967	I-57
I-40	Pacific bottom fish, U.S. landings by species 1963-1973	I-58
I-41	Atlantic bottom fish, landings and value, 1963-1972	I-59
I-42	Atlantic bottom fish, landings and value, by species, 1963-1972	I-60
I-43	Atlantic bottom fish, U.S. sources and disposition, 1960-1972	I-61
I-44	Supply of bottom fish fillets and steaks, 1960-1973	I-62
I-45	Sea Herring - landings and processed product, Maine, 1963-1973	I-63
I-46	Canned sardines, U.S. supply, 1960-1973	I-64
II-1	Estimated earnings and cash flow for Southeast Alaska salmon canner, 1972	II-8
II-2	Estimated earnings and cash flow for Central Alaskan salmon canner, 1972	II-9
II-3	Estimated earnings and cash flow for Western Alaska salmon canner, 1972	II-10
II-4	Estimated earnings and cash flow for Southeast Alaska salmon canners (5-year average 1968-1972)	II-11
II-5	Estimated earnings and cash flow for Central Alaska salmon canners (5-year average 1968-1972)	II-12
II-6	Estimated earnings and cash flow for Western Alaska salmon canners (5-year average 1968-1972)	II-13
II-7	Estimated earnings and cash flow for West Coast salmon canner, 1972	II-14
II-8	Estimated earnings and cash flow for West Coast and Alaskan fresh and frozen salmon processor, 1972	II-15

LIST OF TABLES (Continued)

Table		Page
II-9	Estimated earnings and cash flow for West Coast and Alaskan fresh and frozen salmon processor, 1972	II-16
II-10	Estimated earnings and cash flow for West Coast and Alaskan fresh and frozen salmon processor, 1972	II-17
II-11	Estimated earnings and cash flow for West Coast and Alaskan bottom fish processor, 1972	II-18
II-12	Estimated earnings and cash flow for Atlantic bottom fish processor, 1972	II-19
II-13	Estimated earnings and cash flow for anchovy processor, 1972	II-20
II-14	Estimated earnings and cash flow for Menhaden processor, 1972	II-21
II-15	Estimated earnings and cash flow for Eastern fresh and frozen oyster processor, 1972	II-22
II-16	Estimated earnings and cash flow for oyster canner, 1972	II-23
II-17	Estimated earnings and cash flow for West Coast fresh and frozen oyster processor, 1972	II-24
II-18	Estimated earnings and cash flow for clam canner, 1972	II-25
II-19	Estimated earnings and cash flow for fresh and frozen clam processors, 1972	II-26
II-20	Estimated earnings and cash flow for Maine sardine processors, 1972	II-27
II-21	Summary of financial returns by segment, 1972	II-28
II-22	Summary of basic financial characteristics for selected seafood processing segments	II-30
V-1	Effluent control costs, seafood processing plants, 1972	V-2
V-2	Industrial waste treatment model data--Estimated percent treatment existing for each subcategory	V-6
V-3	Industrial waste treatment model data--Percent Direct Dischargers	V-7
VI-1	Estimated total investment and annual cost of BPT and BAT effluent limitation guidelines	VI-2
VI-2	Number of plants, price effects and BPT impact by industry segment	VI-6
VI-3	Estimated impacts of BPT and BAT effluent limitation guidelines for miscellaneous plants	VI-15
VI-4	Employment in the fresh and frozen packaged fish industry, by size group, 1967	VI-19
VI-5	Employment in the canned and cured seafood products industry, by size group, 1967	VI-19
VI-6	Estimated direct employment loss attributed to BPT and BAT guidelines for selected segments	VI-21

LIST OF TABLES (Continued)

Table		Page
VI-7	Number of plants, price effects and BAT impact by industry segment	VI-24
VI-8	Estimated impacts of BPT and BAT effluent limitation guidelines	VI-29
VII-1	Solid waste disposal summary of selected seafood processing plants in Alaska	VII-8

ECONOMIC ANALYSIS OF EFFLUENT GUIDELINES SEAFOOD PROCESSING INDUSTRY

EXECUTIVE SUMMARY

I. INDUSTRY SEGMENTS

A. Introduction

This study analyzes the economic impact on selected segments of the seafood processing industries resulting from the imposition of the effluent limitations guidelines proposed by the Environmental Protection Agency (EPA). The study based its analysis on one recommended "end of pipe" treatment strategy and the costs associated with it as provided by the EPA.

The industry segments included in the study are:

1. Oysters, fresh and frozen
2. Oysters, canned
3. Clams, fresh and frozen
4. Clams, canned
5. Fish meal, menhaden and anchovy
6. Salmon, fresh and frozen
7. Salmon, canned
8. Sea herring (sardines), canned and fillets
9. Pacific bottom fish, fresh and frozen
10. Atlantic bottom fish, fresh and frozen
11. Scallops
12. Abalone

In actuality, the industry is not technically so segmented. Numerous processors operate multi-species plants and combine fresh, frozen and canning operations. This study considered only those plants in which a particular segment constituted 80 percent of the value of a plant's production. Neither specialty nor reprocessing plants were included.

The study, based essentially upon secondary data, examined the designated segments in terms of their plant numbers, their geographic and economic concentrations and their volumes of domestic production and imports and exports in order to determine broad production and consumption trends.

B. Classification of Firms and Plants

The industry segments in the study are included in three of the 1972 Standard Industrial Classification categories:

SIC 2091: Canned and cured fish and seafoods
SIC 2092: Fresh or frozen packaged fish and seafoods
SIC 2094: Animal and marine fats and oils

1. Number and Location of Firms and Plants

The tables appended to Chapter I (Tables I-1 - I-11) indicate plant totals included within each considered segment. Data compilations from the National Marine Fisheries Services did not accommodate a perfect fit for each segment; therefore, the segments could not be perfectly reflected.

In addition to the plants listed in Tables I-1 -I-11, Alaska has 150 plants processing salmon, bottom fish or herring.

The largest segment in terms of number of plants is that of the fresh and frozen oyster which has 407 plants (338 with an 80 percent oyster production ratio) located primarily in the Gulf and Chesapeake areas. The second largest is the bottom fish segment with 224 plants (142 with an 80 percent bottom fish production ratio). The plants are located in all U.S. coastal regions.

Table I-12 categorizes by species all of the 726 seafood processing plants considered in this study.

2. Geographical Concentration of Plants

The economic effect of pollution control costs is partly determined by industry location; consequently, the economic contractor analyzed industry data to determine the geographic concentration of the seafood processing industry. The following table indicates the regional location of plants whose production is at least 80 percent devoted to a specific industry segment.

Region	Number of Plants
Northeast	108
Mid-Atlantic	47
Chesapeake	142
South Atlantic	45
Gulf	175
Pacific	76
Great Lakes	35
Mississippi	7

Obviously other variables will determine the effect of plant location. These include: the radius of multi-plant location regions, the extent to which the seafood processing industry employs regional labor forces, the numbers of plants in a given location; and the economic characteristics of a given location.

C. Economic Concentration in the Fisheries Industry

Because the industry is characterized by single-plant firms, DPRA measured industry concentration upon a plant-by-plant basis. When measured by sales, the industry showed 20 percent of its plants with sales of $25,000 or less, 42 percent with $100,000 or less, and 14 percent with $1,000,000 or more. Industry output data indicate that the four largest plants produce 17 percent of the industry's production, and the 1,389 smallest plants (87 percent of the industry's plants) product 16 percent of the total output. The disparity is increasing as the smaller plants give way to larger ones. Importantly, industry concentration is not uniform: some segments (e.g., canned tuna and canned salmon) are dominated by a relatively few producers; others have their production dispersed among many small plants.

D. Level of Integration

Horizontal integration typifies the industry. Though some segments do show vertical integration, seasonal species production encourages horizontal integration with its advantages of extending production times and spreading fixed costs.

E. Technological Status of Industry

Few generalizations would be universally valid for the various industry segments. Large plants tend to be more mechanized and efficient than small units. Differential rates of return and profit levels are, in part, a result of the level of plant and firm mechanization and technological sophistication.

F. Domestic Production, Imports and Exports

Data by segment indicated the volumes and values of production, of imports, and of exports.

1. Oysters

Domestic oyster landings in 1970 amounted to 53.6 million pounds valued at $29,485,000, 4.8 percent of the value of all domestic landings. Fresh shucked oysters, the most important oyster product, accounted for 50 percent of all oyster products. Imports in 1972 of $16,000,000 were 25 percent of domestic production. Canned oyster imports account for nearly 80 percent of all oyster imports. Oyster canning plant numbers decreased from 28 in 1964 to 19 in 1972.

2. Clams

The upper half of the Atlantic seaboard harvests approximately 95 percent of the total U.S. clam production. The 1971 value of domestic clam production was $63,000,000; imports amounted to $3,380,000. During the past seven years, the production of canned clams has declined, and the numbers of small canning plants unable to realize relative economies of scale have decreased. During this period, the quantity of fresh, frozen, and specialty clam production has doubled.

3. Menhaden Reduction

Menhaden production is the most important species production in terms of landings and it exceeds the second species by a factor of three to five. In relative value, however, it is exceeded by several others. Virtually all landings are used to produce fish meal, solubles, and oil, and during the last ten years, menhaden meal has accounted for 54 percent to 75 percent of the total U.S. production of dried scrap and fish meal. Menhaden solubles have amounted to 90 percent of U.S. fish solubles production. Yearly production varies considerably but remains at nearly double the production of the early '50's. The total supply of meal and fish solubles has risen from 399 million pounds in 1947 to 1,253 million in 1971. Over the past 26 years, imports have accounted for from 52 percent to 78 percent of total yearly supplies.

4. Anchovies

Anchovy landings are made primary in the San Francisco, California area and have increased by both volume and value since 1964. With the exceptions of 1968 and 1971, yearly totals have gradually risen: in 1964, 4.98 million tons with a processed value of $820,000 were landed; in 1973, 229,286 million tons at $5,253,000 were landed.

5. Salmon

Salmon landings follow a 3 to 4 year cycle. In 1947 landings were 454,236,000 pounds (round-weight) and were 216,685,000 pounds in 1972, a contrast that indicates the potential shifts in production. The outlook is highly dependent on future landings. Domestic supplies and prices are also responsive to export demands. The reduced landings of recent years have produced short processing seasons in some areas.

6. Pacific and Atlantic Bottom Fish

In general, most U.S. consumption supplies of Pacific and Atlantic bottom fish are supplied by imports (81 percent of apparent consumption of Atlantic bottom fish in 1968 came from imports). Because of the pressures of foreign fish producers and the low utilization of existing plants, concern is felt for the continued existence of the industry.

7. Sea Herring

The sardine industry, too, is heavily influenced by imports; recent figures indicate that impacts amount to 68 percent of the U.S. total consumption supply. The intense localization of the industry increases the relative importance of the industry in overall U.S. production (only 2.6 percent), for only two plants in Maine and two in Alaska process sea herring fillets. The decline of the industry would considerably affect local economic conditions.

G. General Technological and Production Characteristics

Particular production and technological characteristics of the fish food processing industry are influential in determining the economic impacts which will result from the costs of imposed pollution control standards. In large measure, the industry suffers from the presence of great numbers of small, single family operations, from the underutilization of production facilities, from dwindling resource stocks, and from intense foreign competition. Such conditions are not conducive to the introduction of capital to finance the costs of added pollution control systems nor do they encourage the pass-through of those added costs to consumers in the face of foreign import price competition.

II. FINANCIAL RETURNS AND FINANCIAL CHARACTERISTICS OF THE INDUSTRY

This chapter considers those industry financial characteristics which bear upon the industry's capacity to absorb the increased costs of pollution control or to acquire capital to finance it. The widely varying corporate structure of the industry, its diverse technological requirements, the state of its equipment, and the relative insufficiency of published industry data have greatly complicated the economic contractors investigations. The study has depended in large measure upon the economic contractor's estimate of investment and operating costs based on such data as unpublished sources and industry consultation. Too, the diversity of industry conditions prevented a plant-by-plant analysis; consequently, for the study models were constructed of representative plants projected on the basis of a return-on-sales framework of analysis.

A. General Considerations

Except for the salmon, clam, and fish meal segments of the industry, the industry is characterized by small plants whose initial capitalization requirements were frequently low enough to encourage entry and, subsequently, to result in a highly competitive, fragmented industry. Though, because of the possibility of plant modernization, the age of plants is not a reliable index of their production efficiency, plant age is frequently a limiting financial determinant. Older plants, for instance, are often surrounded by more recent industrial units that utilize the land required for waste treatment or place its value beyond economically reasonable limits; the plants are often located within disfunctional zoning regulation boundaries or on unsuitable terrain for waste disposal or treatment.

These characteristics result economically in the underutilization of plant capacity, in the lack of raw products, in difficulties in acquiring capital, and in the declining number of small plants.

B. Constraints on Financing Additional Capital Assets

Though doubtless much depends upon the eventual capital costs of pollution control systems, the major industry plants and those which have economic value or processing utility within larger parent conglomerates will apparently face few limiting factors in their financing such costs. Smaller plants and individual operations, however, may find in the presence of other economic considerations (i.e., depreciated capital costs, marginal production, considerable "market" or "salvage" value), that the increased costs of pollution controls cannot justify continued production solely on economic grounds.

C. Estimated Earnings and Financial Considerations by Segment

Obviously model plants, by definition and fact, cannot specifically reflect individual plants. Variations among plants will occur that functional models cannot represent; therefore, the economic contractor utilized broad profitability measures, and sensitivity analyses were used to account for unexplained profitability variations. The model costs were aggregated into product or plant related categories.

1. Alaskan Salmon Canning

Profitability estimates in the Alaskan Salmon canning industry are low enough to discourage new capital investment. Figures for 1972 for twelve model plants indicate losses at 40 percent of sales because of extremely low utilization rates. Even a five-year projection figure (1968-1972), though it shows profits as a percent of sales from 1 percent to 5 percent before taxes, is discouraging when one considers the risk and variability in future salmon runs.

2. West Coast Salmon Canning

The two model plants ($600,000 sales and $2,500,000 sales) of this segment were shown to be operating at 50 percent of capacity and to have a positive cash flow. Before tax return on sales were 6.1 and 9.9 percent respectively.

3. West Coast Fresh and Frozen Salmon

Five models ranging in size from 20,000 to 1,350,000 pounds represent this segment. In general, these plants had positive cash flow and a profitability rate of 4.5 to 8.8 percent tax return on sales. The smallest plant with total assets of $17,000 had a return on investment between 6.5 and 14.5 percent.

4. West Coast Bottom Fish

Bottom fish and halibut processors showed low levels of profitability: the small, bottom fish plant and the halibut processors all showed losses. Before tax return on sales for the bottom fish processors varied from -11.2 to + 2.8 percent.

5. Atlantic Bottom Fish

The three plants of this segment, operating at 75 percent of capacity, showed a before tax return on sales of 2.3 to 5.3 percent. Returns on investment were 3.2, 3.7, and 5.8 percent.

6. Fish Meal

The two models--one for anchovy reduction and one representative of small menhaden producers--developed for this segment had positive cash flows and profits: the menhaden plant model had a before tax return on sales of 3 percent; the anchovy plant model showed a 6 percent before tax return on sales.

7. Oyster

All oyster model plants indicated a positive cash flow and returns ranged from a 2.9 to a 5 percent before tax returns on sales. Returns on investment were 4.6, 8.7, and 8.5 percent.

8. Clam

The two models of this segment showed a before tax return on sales of 4.4 and 4.9 percent for the canned clam and the fresh and frozen clam plants.

9. Maine Sardine

One small and one large plant model were developed for this segment. The higher rate of utilization in the smaller plant resulted in its 5.4 percent before tax return on sales in comparison to the larger plants 3.7 percent. The higher 1972 rate of utilization, however, should not be expected over the long run.

D. Summary Conclusions

1. Alaskan seafood plants in 1972 were unprofitable; they were but marginally profitable over the 1968-1972 average.

2. Larger plants are generally more profitable than smaller ones.

3. Returns on investment to most segments are below current interest rates.

III. PRICING

Pricing in the food fish processing industry has become highly competitive. Rising consumption without a compensating rise in domestic or world production has intensified competitive buying among processors and distributors in various parts of the world and has resulted in record prices; consequently, the fish food processing industry has become concerned over its potential to add on or pass through these costs resulting from added pollution controls.

A. Price Determination

Industry structure and the prevalence of small plant units prevent most processors from exercising significant influence over final product prices. Because supply and demand are the most forceful influences in the industry, recent price increases have caused concern and raised the possibility that as seafood prices reach peak levels future price increases will encounter resistance and reduced sales.

Exvessel prices, established at regional auctions, markets, and contracts are sensitive to landings and to plant utilization. Producers must decide daily whether exvessel prices and volumes warrant plant operations at reduced utilization levels. Processors frequently establish whole-landing purchase contracts with individual boats or fleets.

Wholesale prices are also determined daily for some products. Too, processors, in order to maintain markets, must expand product lines by accommodating processing to wholesaler demands. Cold storage units have allowed some processors to hold products in order to capitalize on higher off-season prices. Obviously, too, landing rates and supplies influence wholesale prices.

B. Potential Price Effects

In so highly competitive an industry, the price effects of added pollution costs are critical because of the industry's reduced potential to absorb or to pass through those costs. Inevitably, the problem, the data needed for accurate analysis, and the complex factors involving that analysis, must, in the face of insufficient published data, rely upon qualitative judgment. In addition to the specific costs of the pollution control system itself, the eventual price effects of those costs will be a product of a widespread spectrum of supply and demand considerations including such characteristics as supply and demand elasticities, product substitutability, foreign demand, production utilization, capitalization factors and material and labor characteristics.

IV. ECONOMIC IMPACT METHODOLOGY

The economic contractor measured the economic impact of pollution control costs on the fish food processing industry through such procedures as discounted cash flows and break even analysis. In addition to generally available data, DPRA employed quantity and sales data applicable to virtually all primary seafood processors which allow for the consideration of selected individual characteristics of all plants within the framework of a return-on-sales analysis. Profitability measures and model plant data, however, were used to assess the severity of the impacts.

A. Fundamental Methodology

The analytic methodology involved five distinct factors:

(1) Industry Segmentation: Industry data on plant size, production, seasonal rates, and product specialization were applied to determine plant characteristics and resultant control requirements. Segmentation analysis met the 80 percent specialization requirements described in Chapter I.

(2) Pollution Abatement Cost Conversion: The cost data supplied by EPA were made applicable to each model plant configuration. The data included capital outlay, maintenance and operating costs, and debt costs. Land acquisition costs for technologies requiring additional land were not included. Too, the estimates for capital acquisition interests were necessarily conjectured for a time of rapidly fluctuating interest rates.

(3) Preliminary Impacts: Preliminary impacts were computed by expressing total annualized costs of pollution control as a percent of sales. Profitability measures were employed to determine the potentiality of plant closures. Differences in profitability and variations in processing were accounted for by profitability ranges and sensitivity analyses.

(4) Price Effects: Determining specific plant and product price effects is conceptually the most complex step in this methodology. The variables are wide-ranging and include among the most important determinants such factors as industry structure, the strength of product demand, the availability of substitute and complementary products, and the magnitude of impacts and industry abatement cost differences. An important assumption of the procedure is that price effects are assumed to approximate the costs of controls applicable to the largest producers.

(5) Estimated Impacts: The final methodological step was the estimating of the number of plants that will close under the impact of pollution control costs by relating before-and after-control imposition levels of profitability. The procedure involved measures of plant values, labor characteristics, industry trends and levels of technology, and capital acquisition potentiality.

V. EFFLUENT CONTROL COSTS

The three EPA designated effluent control systems considered in this report are:

- BPT - Best Practicable Control Technology Currently Available; to be achieved by July 1, 1977.
- BAT - Best Available Control Technology Economically Achievable; to be achieved by July 1, 1983.
- NSPS - New Source Performance Standards; apply to any source for which construction starts after the publication of the standards.

A. Description of Effluent Control Levels and Costs

The economic contractor assumed EPA's technological requirements and descriptions for all control data and costs in the preparation of this report and included EPA's revised estimates in its model configurations. Additionally, costs associated with land preparation (though not for land acquisition) were included for those technologies requiring land for effluent control.

B. Current Status of Effluent Control in the Industry

The economic contractor recognized and reported the percentage of the diversity of treatment systems currently employed by the industry. These range from systems linked to municipal wastewater treatment technologies to those which discharge effluents directly into the ocean. The costs of each will vary and depend upon the availability of municipal systems, the service costs for their use, and the municipal ordinances which may or may not prevent their use. Systems which discharge directly into the ocean may presently so discharge all effluents or may discharge only through pipe screens which retain solids for further by-product processing or for land-fill disposal.

Though the analysis reported only "end-of-pipe" system costs, it is well to note that systems employing municipal treatments will also be impacted.

VI. IMPACT ANALYSIS

The study projected the effects of the proposed pollution control costs on:

Price
Financial factors
Production
Employment
Community factors, and
Balance of trade.

A. Total Investment Required Under BPT and BAT

BPT costs were calculated on a plant-by-plant basis and then aggregated for each segment and for the nation. Systems currently utilizing municipal waste treatment plans or currently employing "in-place" screening technologies are not included in the totals.

Total BPT investment = $ 5,541,000
Total BPT + BAT investment = $11,157,000

Total annual costs (include debt service, operation and maintenance) for

BPT = $1,160,000
BPT + BAT = $2,495,000

B. Price Effects

The food fish processing industry is one with relatively low value added and low profit margins in relation to sales; thus, if an increase in processor margins can be expected as a result of mandatory effluent treatment practices, the advance impacts of those controls on the industry will be substantially ameliorated.

The structure of the industry, the marketing characteristics of its product, and the intense competitiveness of the industry and of its substitute products all argue that the industry is a "price taker" and one not in a position to realize unlimited price increases. A reduction in processor margins in the short run can be expected.

C. Financial Effects

Basic industry data have revealed a great disparity in profit rates, production practices, prevailing technology, and expected future profitability within and among all industry segments. The impacts of pollution control standards within segments were developed using fundamental industry relationships, profitability levels reported by knowledgeable industry representatives, published reports, and derived relationships.

D. Production Effects

Of specific interest are the numbers of plant closures that will result solely from the implementation of BPT and BAT standards (the study considered only those plants currently using neither "end-of-pipe" nor municipal treatment systems) as determined by a return-on-sales framework of analysis.

1. Potential Plant Closures Under BPT Standards

All closure calculations were projected on a plant-by-plant basis; the results were then aggregated into multi-plant groups to prevent divulging individual plant data. (It can be expected that some marginal plants will discontinue operations prior to the date for the mandatory implementation of BPT standards.)

Fish Meal: Economic data indicate that impacts will be felt primarily by plants that do not have soluble treatment systems; thus, six of the industry's twenty-two plants are affected. These plants can carry their solubles to sea (as stickwater, recycled bailwater, or washdown water) by barge or they can, preferably, direct these solubles to nearby plants with adequate treatment systems as is currently done by some plants.

The cost of the BPT guidelines was computed as the cost of barge leasing, in excess of $100,000 per year, for the larger plants. Such costs project the closing of all plants that do not have soluble recovery systems. (Using other plant facilities would alter the projection.) Data indicate that only one plant cannot divert solubles to another. The closure estimate may vary by one or two plants in either direction; nevertheless, overall industry production will not be significantly affected.

Salmon: The salmon processing industry was divided into two categories -- Alaskan and West Coast. In turn, Alaskan salmon was subdivided into "remote" (plants not located in major Alaskan cities or in the vicinity of good transportation facilities or in areas of concentrated processing activity) and "non-remote."

Remote Alaskan plants will be impacted by one percent to approximately 2.6 percent of sales, and only a small portion of this cost will be passed through as higher product prices. An estimated fourteen small plants will close, approximately 11 percent of the production of all remote plants.

Non-remote Alaskan plants will be impacted from 0.4 percent to 7.9 percent of sales. The data indicated that seven plants may be closed, approximately 38 percent of the production of all non-remote plants.

(Obviously, the data indicated so widespread a variation among plants that caution should be exercised in too narrowly applying these estimates. Conceivably, a plant-by-plant analysis of all conditions should be developed.)

The application of the 80 percent specialization formula and the technical data supplied by EPA indicate that the impact of the proposed effluent guidelines will have little effect on West Coast plants. No plants are projected to close.

Bottom Fish: The bottom fish data were categorized into three segments -- Alaskan bottom fish, Non-Alaskan bottom fish, and Miscellaneous bottom fish.

Non-Alaskan bottom fish are projected to be of growing consequence in the industry. At the present time, however, bottom fish comprise a significant portion of only one plant's total production. The costs of the guideline controls are sufficiently high to project the closing of one plant.

Non-Alaskan bottom fish plants devoting 80 percent of production to this category number 142 and are of two types, mechanized and conventional (non-mechanized). Data are insufficient to precisely identify in every case the category to which each plant belongs. Large plants, however, are usually mechanized. Impacts on mechanized plants are minimal, and no plants are projected to close.

Conventional plants are impacted to a greater degree. Small (2-5 ton a day) plants were impacted on an average of approximately .5 percent of sales. Plants between 5 and 15 tons per day were impacted on an average of .20 percent of sales. Larger plants experienced no impact. DPRA estimated that five small plants will close.

Only 17 Miscellaneous bottom fish plants to which EPA's guidelines were applicable were identified. Only one conventional plant was projected to close.

Clams: Where EPA's guidelines were applied to hand-shucked and mechanized clam plants, it was again found that only small conventional plants (2 to 15 tons per day) were disproportionately impacted at 1.25 percent of sales. Two conventional 15 to 45 tons per day plants were projected to close also. The aggregate closings will amount to 5 percent of industry capacity.

Oysters: West Coast, fresh and frozen, oyster processing plants had price impacts ranging from .10 percent for a 3 ton per day plant to .90 percent for a 0.5 - 2 ton per day plant. Three of the smaller plants and one medium (2 - 3 ton per day) were projected to close. The loss represents 20 percent of the industry's total, but this can be absorbed.

Eastern and Gulf, fresh and frozen oyster plants, experienced minimal impacts and indicated no closures. Similar findings were true for Eastern canned oyster and Miscellaneous Eastern oyster processing plants.

Maine Sardines: Cost and impact data were inflated for the Maine sardine segment to allow for the anomalous data recordings resulting from the use of 1972 computations, a year of disproportionately high segment profits. Thus, conservative estimates indicated that only one plant will close and that its overall impact will be minimal.

Scallops: The net impact of controls was projected at 1.9 percent of sales; thus, two plants were estimated as closures.

Herring Fillets: Two plants were identified as applicable, one small (4.5 ton p.d.) and one large at 149 tons p.d. The small plant would close with impacts at 15.3 percent of sales.

Abalone: No abalone plants were projected to close.

Miscellaneous Phase I Plants: Blue crab plants indicate no closures. Only one of the eight catfish plants in this segment is projected to close. Of the 27 shrimp processors included, 11 were projected to close. No significant effects should be felt by the industry as a result of these closures.

E. Employment Effects

The data on industry employment and the effects of plant closure on employment indicated that approximately 750 direct employment positions would be immediately lost; however, much of the industry's labor is relatively skilled, and new plants as well as new process technologies will absorb all but 190 of those displaced workers. Secondary, dependent industry employment impacts, difficult to determine precisely, may well be greater.

F. Community Effects

The economic contractor did not include data on plant locations; consequently, specific community impacts could not be projected. City size, industry concentration, and community industry diversification are three important determinants of the impact of plant closings. Generally speaking, impacts may be severe in communities in Alaska, Maine, and in the rural areas of Chesapeake Bay.

G. Balance of Trade Effects

Although the net balance of trade impacts are not known, clearly any price increase for production costs will greatly aid the already highly competitive foreign processors. Approximately 70 percent of domestic seafood consumption stems from imports, and increased domestic costs will aggravate this ratio.

H. Impact of BPT Guidelines

Obviously, the imposition of higher control standards results in higher closure numbers. The analysis indicated the following closures, by segment, under BPT guidelines.

Segment	Closures
Bottomfish	
1. Conventional	5
2. Mechanized	0
3. Alaskan	1
Clams	
1. Fresh and frozen (conventional)	6
2. Fresh and frozen (mechanical)	0
Oysters	
1. Eastern, canned	0
2. Eastern, fresh and frozen	0
3. West Coast, fresh and frozen	4
Maine Sardines	1
Fish Meal	
1. With solubles	0
2. Without solubles	1
Salmon	
1. Alaskan, remote canned	6
2. Alaskan, non-remote canned	3
3. Alaskan, remote fresh and frozen	4
4. Alaskan, non-remote fresh and frozen	8
5. West Coast, canned	0
6. West Coast, fresh and frozen	0
Abalone	0
Herring Fillets	1
Scallops	2
Total BPT Closures	42

Clearly, industry trends, new technologies, improved plant facilities revised EPA guidelines, and other production determinants can modify these projections.

I. Combined Impact BPT and BAT Guidelines

The closures resulting from BPT and BAT combined guidelines are:

Segment	Closures
Bottomfish	
1. Conventional	11
2. Mechanized	2
3. Alaskan	1
Clams	
1. Fresh and frozen (conventional)	6
2. Fresh and frozen (mechanical)	0
Oysters	
1. Eastern, canned	0
2. Eastern, fresh and frozen	0
3. West Coast, fresh and frozen	4
Maine Sardines	5
Fish Meal	
1. With solubles	0
2. Without solubles	1
Salmon	
1. Alaskan, remote canned	11
2. Alaskan, non-remote canned	8
3. Alaskan, remote fresh and frozen	4
4. Alaskan, non-remote fresh and frozen	14
5. West Coast, canned	2
6. West Coast, fresh and frozen	0
Abalone	0
Herring Fillets	1
Scallops	2
Total BAT Closures	72

J. Impact of NSPS

The imposition of the NSPS will not prevent new investment in the industry. Present closures under BPT and BAT standards are generally confined to marginal plants, and new plants will not face the problems such plants must deal with. New facilities that are currently planned tend to be large, mechanized, and efficient multi-specie processing units, characteristics that encourage profitability.

VII. LIMITS OF THE ANALYSIS

The very complexity of the seafood processing industry makes economic projections on a plant-by-plant basis hazardous. The availability of raw materials, the conditions of procuring it, the seasonal and geographic determinants of the industry, the vast array of production characteristics and technologies, and the economic conditions under which the industry operates all contribute to the problem.

Considerable efforts were made to discriminate among data and to refine published sources where possible. Original, published data sources, industry consultations, national data sources from research and government agencies were adopted to the study for its projections of financial ratios and performances and to check its reasonableness.

Obviously, so complex a study also required the exercise of considerable qualitative judgment. To the extent that such is true, major sources of potential error are enumerated in the study and must be considered by reviewers. Such judgment entered into the consideration of matters pertaining to (1) control costs, (2) current industry waste treatment, (3) individual plant economic data, (4) "shutdown" decisions, (5) price effects, (6) inflationary trends, (7) extent and specific waste treatment procedures, and specific locational characteristics, especially for the Alaskan industries.

ECONOMIC ANALYSIS OF EFFLUENT GUIDELINES SEAFOOD PROCESSING INDUSTRY

I. INDUSTRY SEGMENTS

A. Introduction

This study analyzes the economic impacts of the Environmental Protection Agency's effluent control standards on selected segments of the seafood industry. The study applied EPA's estimated cost data for the installation of controls to applicable economic data for the industry to determine the effects that such costs would have on industry profitability, employment, and growth.

Not all seafood industries are considered in this study. The economic contractor's selected segments were determined by the availability of effluent control costs data as supplied by the Environmental Protection Agency. 1/ Additionally, the analysis is limited to considering the economic impact of but one effluent control technology--an "end of pipe" treatment. The limitation excludes considering costs which may result from effluent control regulations imposed by state environmental agencies and costs associated with effluent technologies employing municipal waste treatment facilities.

The seafood industry segments considered in this analysis as determined by the EPA's estimated cost data are:

1. Oysters, fresh and frozen
2. Oysters, canned
3. Clams, fresh and frozen
4. Clams, canned
5. Fish meal, menhaden and anchovy
6. Salmon, fresh and frozen
7. Salmon, canned
8. Sea herring (sardines), canned and fillets
9. Pacific bottom fish, fresh and frozen
10. Atlantic bottom fish, fresh and frozen
11. Scallops
12. Abalone

1/ The cost data are described in Development Document for Effluent Limitations Guidelines and Proposed New Source Performance Standards for the Fish Meal, Salmon, Bottom Fish, Sardine, Herring, Clam, Oyster, Scallop, and Abalone Segment of the Canned and Preserved Seafood Processing Point Source Category, The United States Environmental Protection Agency (August, 1975).

The effluent control cost data supplied by EPA were reflective of single specie production and, although such specialized production does exist occasionally (i.e., menhaden reduction), industry plants are characteristically multi-product. The conceptual difficulties attendant upon any attempt to apply rigorously the single specie cost data to the infinite combinations of multi-products effectively excluded such an analysis. The economic contractor, consequently, considered only those specified segment plants in which 80 percent of total product specialization was devoted to a considered specie. (Where noted in the ensuing report multi-product rates were also considered.) Reprocessors of the above species and producers of specialty items were excluded from the analysis.

The remainder of this chapter is devoted to a general description of the above industry segment plants. It considers plant numbers, geographic concentration, economic concentration, domestic production volumes, and import and export volumes. The discussion, based as it is on secondary data, is intended only to delineate broad production and consumption trends.

B. Classification of Firms and Plants

In general, the firms and plants included in this analysis are included in three 1972 Standard Industrial Classification (SIC) codes:

SIC 2091 - Canned and cured fish and seafoods (partial)

Establishments primarily engaged in cooking and/or canning fish or shell fish.

SIC 2092 - Fresh or frozen packaged fish and seafoods (partial)

Establishments primarily engaged in preparing fresh and raw or cooked frozen packaged fish or other seafoods.

SIC 2094 - Animal and marine fats and oils

Establishments primarily engaged in manufacturing animal oils, including fish oil and other marine animal oils, and by-product meal; and those rendering inedible grease and tallow from animal fat, bones and meat scrap.

1. Number and Location of Firms and Plants

This report emphasizes primary commercial processors of the above products and/or species. Many wholesalers, reprocessors and specialized custom packers are located throughout most seacoast and nonseacoast states, but such plants will not be considered in this report and are, therefore, excluded from the plant lists presented below. (All tables and figures have been included as an attachment at the end of the chapter.)

The following summary of plant numbers by species and region reflects plant numbers and location data developed from plants lists provided by the National Marine Fishery Services and are shown in Tables I-1 through I-11.

In considering Tables I-1 - I-11 the reader should note (1) that the tables show the overall number of plants within each segment as well as those with 80 percent product specialization rates, and (2) the segments, because they are frequently quite broad and inclusive, are not perfectly representative of this study's segment categories (i.e., the bottom fish segment includes both Atlantic and Pacific bottom fish including halibut and species other than rock fish, flounder, cod, and haddock). The reader should examine the classification definitions included in each table.

In addition to the plants listed in Tables I-1 to I-11, 150 Alaskan seafood processing plants process salmon, bottom fish or herring. Alaskan plant numbers were constructed from state publications, national canner listings and personal interviews. Some of the processors on the Alaskan list are more analogous to wholesalers as they do little processing.

The largest segment in terms of number of plants, 407, is the fresh and frozen oyster segment. In 338 of these plants, oysters account for more than 80 percent of total plant sales. These plants are located primarily in Gulf and Chesapeake regions 47 and 38 percent respectively, which account for approximately 85 percent of all fresh and frozen oyster plants.

The second largest segment is that for bottom fish. This segment, as described, contains all bottom fish and selected finfish plants. A total of 224 plants are included, and in 142 of these bottom fish account for greater than 80 percent of total plant sales. The segment's plants are dispersed throughout all coastal regions of the U.S. The Northeast region has the greatest concentration.

A summary of both Alaskan and Non-Alaskan plant numbers by select species is presented in Table I-12. A total of 726 plants are listed in Table I-12 and will be considered in this report.

2. Geographical Concentration of Plants

The preceding section presented plant numbers without significantly indicating their geographic concentration. The plant list does not specify particular community locations, but because community impacts are an important determinant of mandatory pollution abatement standards, additional efforts were made to determine the extent to which geographic concentration, or plant clusterings influence community impacts.

Community impacts depend upon the number of plants adversely impacted and their economic importance to local communities. Later sections of this report delineate these plant numbers. At this point, it is sufficient to describe briefly the geographical clustering of plants to indicate the dependence of local economies on various segments of the seafood processing industry.

The Gulf Coast region has the largest number of plants in the 48 contiguous states, with approximately 30 percent of all 80 percent plants. The next most important region is the Chesapeake region with approximately 20 percent. The Northeast region is the next most important followed by the Pacific region. The following summary presents only the numbers of 80 percent plants by region.

Region	Number of Plants
Northeast	108
Mid Atlantic	47
Chesapeake	142
South Atlantic	45
Gulf	175
Pacific	76
Great Lakes	35
Mississippi	7
Total	635

Table I-13 indicates the number of plants in and the 1970 population estimates for selected cities to further underscore the potential impacts upon communities of various segments of the industry. So basic an industry index as this generally indicates the dependence of some communities on processing plants. As the table shows, for instance, nearly every segment has several plants located in small communities. In some instances--the Maine sardine and the Chesapeake fresh and frozen oyster industries are typical examples--an industry's plants are widely dispersed and are located in small rural communities who depend upon them for their major economic and employment base. It should be recognized, too, that locational description indices based upon a community-by-community analysis may obscure the fact that industry plants may well be concentrated in an area and draw from a common labor pool.

In summary, the location data presented and other information concerning the regional importance of the seafood processing industry clearly indicate that community and regional economies may be directly related to the economic fortunes of the seafood processing industry. If mandatory pollution abatement standards adversely impact selected segments of the seafood processing industry, severe community and regional impacts should be expected. The severity of the community impacts depends on the number of plant closings and the importance of these plants to the communities.

The discussion of plant location and clustering as related to community impacts must make special note of the Alaskan seafood processing segment. Limited employment opportunities, high unemployment rates and significant plant clusterings increase the potential for adverse and prolonged community and employment impacts if plant closures result from the guidelines. On the other hand, clustering of plants can help to reduce unemployment if the total quantity of output from the community is maintained from an unchanged level of raw product.

C. Economic Concentration in the Fisheries Industry

Data from the 1967 Census of Manufactures indicates the following level of concentration in the canned and cured and the fresh and frozen packaged seafoods segments.

	Percent of total value of shipments accounted for by:			
Product Line	4 largest companies	8 largest companies	20 largest companies	50 largest companies
Canned and cured seafood	44	59	73	85
Fresh or frozen packaged fish	26	38	56	72

The above industry firm data indicate concentration in the seafood processing industry when grouped into broad SIC categories; however, much of the concentration is accounted for by segments such as canned tuna or canned salmon whose firms produce a relatively large volume of output, contribute a relatively large portion to total industry sales and possess a significant amount of economic or production concentration. These segments tend to overshadow highly fragmented segments such as oyster and bottom fish processing. The "distortion" is negated by analyzing industry concentration on a plant rather than firm ownership basis. Though the former is not a usual measure of industry concentration, its use is functional to this study because the seafood industry is characteristically one of a multiplicity of single plant firms. (This method clearly shows that most seafood processing plants, considering all segments, are quite small (42 percent of all seafood processing plants had sales less than $100,000 in 1972.) Thus, since most seafood processing segments consist primarily of single plant firms, the concentration ratio on a plant-by-plant basis is viewed as representative of or an accurate portrayal of production concentration.

The numbers and percent of plants by size for 1970 and 1972 are presented in Table I-14. For example, approximately 20 percent of all seafood processing plants had sales of $25,000 or less. Forty-two percent had sales of less than $100,000. Only 14 percent of all plants had sales of $1,000,000 or more. As will be pointed out below, many segments of the seafood processing industry have a few larger plants which produce a significant portion of total output while the remainder of the output is produced by numerous small, single-family operations.

Additional plant production concentration data are presented in Table I-15 which shows that the four largest plants (approximately one-fourth of one percent by number) produce approximately 17 percent of total output. The 1,389 smallest plants (approximately 87 percent of all plants) produce only 16 percent of total output. Both tables clearly show that the industry may be characterized as one of many very small plants. Table I-14 shows that the total number of processing plants in the industry is lower for 1972 than 1970, however, the total number of processing plants fluctuate from year to year depending on the catch level. At also appears (and industry contacts suggest the same) that the reduction in plant number is basically occurring among the small plants with an increase in the concentration of the large plants.

Additional concentration measures for selected industry processing segments are presented in Table I-16. This table shows that for many of the segments a very small number of plants produce a significant share of total industry output. The remainder of the industry, however, is comprised of numerous very small plants. Tables I-17 through I-21 present numbers of plants and percent of plants in various size categories which further illustrate the large number of extremely small plants in selected segments. Thus, Table I-21 indicates that 23 percent of smallest bottom fish plants product less than 1 percent of total industry output and Table I-19 shows that 33 percent of the smaller fresh and frozen oyster plants produce only 3 percent of the segment's total output.

D. Level of Integration

Integration within the seafood processing industry varies by product. Broad industry-wide measures of integration do not exist but would doubtless also distort industry plant-by-plant characteristics by overemphasizing the role that the larger plants and firms that possess considerable integration have on the industry.

In general, horizontal integration by product is very common and advisable. Many production seasons for selected species are short, and horizontal integration provides a means for increasing the length of the operating season and spreading fixed costs. Horizontal integration (multiplant integration) is most common in the salmon and menhaden reduction industries. (Vertical integration is also found in some segments, e.g. menhaden reduction; however, since processing segments were treated as separate entitites in the study and the profitability and impacts were estimated on a processing unit basis only, vertical integration was not examined in great detail.)

Table I-22 briefly summarizes the concentration (number of plants) and product and plant integration for selected seafood processing companies. This table shows that multiplant companies are common in various segments. It also indicates that multiplant companies are common in the Alaskan salmon processing segments: Alaskan Packers Association, Bumble Bee Seafood and the New England Fish Company produce a significant portion of the total Alaskan salmon pack. The table further shows that species and/or product integration is also common. Some firms are, themselves, owned by diversified conglomorates, e.g. Bumble Bee is a subsidary of Castle & Cooke, Inc.

E. Technological Status of the Industry

The industry's technological levels both within and among industry segments is an important determinant of profits, process and effluent loads. Industry technological levels, however, are difficult to describe for change is constant as new lines are added and new equipment installed. Also, plants and equipment are a blend of new and old components. Variations within industry segments appear to be as great as variations among segments; however, generally the larger plants and firms are technologically more advanced than are the numerous small plants, a condition which may explain, in part, why a disproportionately large number of small plants have left the industry in recent years.

Technological differences are too obscure to be included in the analysis. Only a few broad generalizations are possible. New England bottom fish segments tend to be more heavily mechanized than West Coast segments. Alaskan salmon segments tend to be almost completely mechanized as opposed to small West Coast salmon plants which, in some cases, hand butcher salmon. Mechanized oyster and clam operations are increasing in number to partially eliminate critical labor restraints. Again, they tend to be the larger plants.

Financial profiles were established for several size categories within each industry segments (Tables II-1 - II-22) and the indicated differential rates of return and profit levels for these size categories are, in part, a result of technological differences.

F. Domestic Production, Imports and Exports

A compendium of domestic landings, domestic production, and the volumes of imports and exports is presented in this section to further characterize the industry. While only broad coverage of these items is included, they are data basic to understanding the segments' ability to withstand the impacts of pollution abatement standards. The data, as reported by federal fishery statistics sources, are found in Tables I-23 - I-49.

Oysters (Tables I-23 - I-25)

Domestic oyster landings in 1970 were 53.6 million pounds. Approximately 46 percent of this volume was harvested in the Chesapeake area. Gulf Coast landings accounted for 33 percent, and the Pacific Coast states, 14 percent. The remainder was harvested in the New England, Middle Atlantic and South Atlantic regions.

The total value of landings was $29,485,000 in 1970. Oysters ranked as the seventh most important species of relative value of all segment landings.

Fresh shucked oysters are the most important processed oyster product accounting for 75 percent of the total value of all oyster products. The value of imports in 1972 totaled approximately 16 million dollars while the value of domestic production was approximately four times this amount. Imports of canned oysters account for nearly 80 percent of all oyster imports.

It is significant to note that the number of oyster canning plants has decreased from 28 in 1964, to 19 in 1972 and reflects a continuing decreasing trend in the number of plants in this industry. The above plant numbers do not reflect the 80 percent specialization criterion.

Clams (Tables I-26 - I-28)

New England, Chesapeake and Middle Atlantic regions harvest approximately 95 percent of the total U.S. clam landings. The major region is the Middle Atlantic area, accounting for approximately 63 percent of U.S. landings in 1970. New England accounted for roughly 10 percent of all landings, and the South Atlantic, Gulf and Pacific regions each accounted for less than one percent.

Imports of clam products amounted to 3.38 million dollars in 1971 and domestic production was 63 million dollars.

Fresh and frozen and canned clams accounted for approximately 90 percent of the domestically produced clam products (specialties accounted for the remainder). During the past seven years the produced quantities of fresh and frozen (and specialty items) has doubled, and the production of canned clam products has declined in absolute terms. The number of (apparently mostly small) clam canning plants has declined from 39 in 1965 to 24 in 1971. Increasing labor costs and the diseconomies of scale inherent in smaller plants have gradually forced these smaller clam canners out.

Menhaden Reduction (Tables 1-29 - I-31 and Figures I-1 and I-2)

Menhaden is the single most important species in terms of relative volume of all species' landings and exceeds the poundage of the next most important species by a factor of three to five. In terms of the relative value of the landings, however, menhaden is exceeded by several other species.

Virtually all menhaden landings are used in the production of fish meal, solubles and oil. During the past ten years menhaden meal has accounted for 54 to 75 percent of the total U.S. production of dried scrap and fish meal and menhaden solubles have accounted for as much as 90 percent of the U.S. production of fish solubles.

Menhaden are landed throughout the Middle Atlantic, Chesapeake and Gulf fisheries with the Gulf region accounting for as much as 75 percent of all menhaden landings in 1969. U.S. landings of menhaden by state and region from 1963 to 1971 are shown in Table I-29.

The volume of U.S. production of menhaden products and the total value of domestically produced menhaden products since 1947 are presented in Table I-30. U.S. production of dried scrap and menhaden meal reached a peak of 495,102,000 pounds in 1961 and has fluctuated between this amount and a low of 238,270,000 pounds since 1961. Using a five year average (1955-1959) as a base production period, the U.S. production of dried menhaden and scrap varied from +25 percent ot -38 percent of the base production level since 1960, but it has remained at nearly double the levels of the late 1940's and early 1950's.

The total U.S. production of all dried fish scrap and meal, solubles and menhaden oil is presented in Table I-31 and the total U.S. supply of meal and solubles including imports is shown in Table I-32. The total supply has grown from 399 million pounds in 1947 to 1,253 million pounds in 1971. Over the 26-year period imported meal represented from 52 to 78 percent of the total supply.

In general, the outlook for fish meal, oil, and solubles is one of relatively short supplies and high prices. The demand for the products is strongly influenced by high soybean prices and exports, by the early 1973 decline in menhaden meal production, and by the increased 1973 and 1974 demand for meal in the broiler chicken feed industry. Of considerable importance, also, indeed the most significant factor, was the severe decline in Peruvian anchovy production (see Figures I-1 and I-2) in 1973. Although the water temperature conditions causing the decline are abating, resource stocks will not be soon replenished. Data indicate that supplies will remain short. 1/

Anchovy (Table I-33)

Anchovy reduction is confined principally to Terminal Island, California. Table I-33 presents anchovy landings in California since 1964. This includes anchovy landings used for all purposes: bait and canned, fish meal and oil reduction.

Anchovy reduction plants generally rely heavily on other fish and/or fish scraps, and many of these plants should be classified as secondary reducers that would not operate as separate entities. They are actually part of a by-product recovery plant associated with large tuna or food fish plants. Effluents from these plants are but a part of the effluent stream from the overall integrated operation and would be treated in a common effluent stream. Indications are that several of these plants do not have separate waste water streams and that they may, therefore, have difficulty meeting separate standards. Additional discussion is devoted to this in later chapters.

Salmon (Tables I-34 - I-38)

Salmon is one of the most important species harvested in the U.S. In 1968, salmon was second in terms of volume of catch (exceeded only my menhaden) and second in terms of value (exceeded only by shrimp).

Landings in 1971 and 1972 were 312,071,000 and 216,685,000 pounds respectively. Landings varied over the ten year period (shown in Table I-34) from 410,119,000 pounds in 1970 to 216,664,000 pounds in 1967. Salmon landings generally followed a 3 to 4 year cycle, and no long-term trends were apparent for the period.

1/ U.S. Department of Agriculture, Economic Research Service, Feed Situation, February, 1974.

Alaska is the major salmon producing state, contributing from 64 to 89 percent of domestic landings (1963 to 1970). The next largest producing states were, in order, Washington, Oregon and California contributing 9, 5 and 2 percent respectively in 1970. Table I-34 presents salmon landing by state and total landings from 1963 through 1970.

Presently, canned salmon production and consumption are greater than those for fresh and frozen salmon; however recent price changes have forwarded the long term trend toward non-canned consumption and production. In 1971 the non-canned segment handled 36 percent of total domestic production as opposed to only 20 percent in 1963. Additional price shifts may render salmon too valuable for canning purposes.

Table I-35 presents aggregate and per capita consumption of canned and non-canned salmon since 1963. No long-term trends were apparent for the period for per capita consumption.

The U.S. supply and disposition of salmon, 1963-1972, is presented in Table I-36. Imports have constituted from 3 to 7 percent of apparent consumption. Over the same time period, exports have varied from 7 to 25 percent of domestic landings. The volume of imports of salmon (canned and noncanned) by country of origin is presented in Table I-37 and canned salmon imports and exports are shown in Table I-38.

The outlook is, of course, highly dependent on future landings. Short supplies have placed upward pressure on prices and have dampened exports. Future exports of fresh and frozen salmon will also influence domestic supplies and prices.

In recent years, the reduced landings have resulted in very short processing seasons in some areas. There is additional concern over foreign fishing and the status of the resource stock. While seasonal fluctuations are to be expected, the drastic declines in harvests have caused additional concern over the stock resource.

Pacific Bottom Fish (Tables I-39 - I-40)

Included in this segment are all of the major species of Pacific bottom fish. The two most significant are flounder and rockfish which together accounted for 62 percent of the segment's volume of landings. The balance of landings were in large part of ocean perch, lingcod, cod, and sablefish (Table I-40). Pacific bottom fish landings (all species included) have been relatively stable since 1950 with annual landings near 105 million pounds.

Table I-39 presents the total West Coast landings and their values by state from 1963 through 1967. The table shows that in 1967 Washington produced 45 percent of all West Coast bottom fish landings followed by California (32 percent), and Oregon (20 percent). The remainder were Alaska landings. Recent indications are that substantial bottom fish stocks exist in Alaskan waters. Interest is increasing in this fishery, but it will be some time before a substantial number of plants are committed to the area.

Atlantic Bottom Fish (Tables I-41 - I-44)

Atlantic bottom fish landings, steadily declining in recent years, are presented in Table I-41 for 1963-1973. Landings and value by species are shown in Table I-42. Flounder accounted for 30 percent of bottom fish landings in 1968, haddock 19 percent and cod 13 percent.

Table I-43 presents bottom fish stocks, landings, imports, exports and total supply. Apparent consumption is also included. Imports of all species of Atlantic bottom fish amounted to 81 percent of apparent consumption in 1968. Consumption and imports have been increasing while domestic landings have been decreasing.

In general, the Atlantic bottom fish industry is a matter of concern. It faces the encroachment of foreign fishing fleets; and, its plant utilization rates are quite low.

It must, however, be recognized that most of the U.S. supply of Atlantic and Pacific bottom fish is supplied by foreign producers. As can be seen in Table I-44, imports far exceed U.S. production.

Sea Herring (Tables I-45 - I-46)

This industry segment includes two categories for sea herring--canned and fillets. The canning segment (Maine sardines) is the larger of the two. There are only two plants in New England that process sea herring fillets and two in Alaska.

The Maine sardine industry has declined from 51 plants in 1951 to 16 in 1974. An estimated pack of 916,800 cases in 1973 should be compared to 3,800,000 cases in 1950. The current pack is about 25 percent of the record pack, and the decline has caused great concern over increasing Canadian competition and the potential depletion of the resource. While the total catch of sea herring constituted only 2.6 percent of the total seafood catch in 1968, the concentration of the industry in Maine makes its economic importance of severe local concern.

Maine sardine landings and pack in recent years are presented in Table I-45. Yearly pack imports, exports and consumption statistics are presented in Table I-46. As with other fishery products, it is not surprising to find a considerable amount of the total U.S. supply available for consumption is imported. The total imports of canned sardines amounted to 68 percent of total supply available for consumption.

G. Additional Characteristics

The landings' volumes and values data presented above and shown in Tables I-23 through I-46 indicate the complexity of the industry and its susceptibility to the economic impacts consequent to the imposition of pollution controls. Further generalization can be made about the character of specific segments that are apropos to an analysis of the economic impacts of such controls. Because those impacts are, in part, determined by plant size, by general economic prospects, and by the potentiality to absorb or pass through added costs, the following brief summary implicitly emphasizes these considerations for each segment.

Bottom fish - The bottom fish segment -- West Coast, Alaska, and Atlantic -- consists of an extremely large number of small plants, many of which are family operations. Underutilization of plant capacity is the rule rather than the exception. Declining and variable landings, and the large volume of imports are of great concern to industry.

Fish meal - The fish meal industry consists of fewer plants, some of which possess considerable economic concentration and economic integration, i.e., several large menhaden companies control several large plants and produce a significant portion of total output. The financial prospects of this capital-intensive and energy-intensive industry in large part depend on world fish meal and energy prices. Several plants and companies were pushed close to or below the "break-even" point during the energy crisis in early 1974.

Oysters - An extremely large number of very small plants exist in the oyster segment. Many of these plants are marginal family operations that produce only a very minute portion of total industry output. Underutilization of plant capacity, little influence on prices, and limited capital acquiring ability accurately characterize many plants within this segment.

Clams - Large, mechanized clam processors coexist with numerous small, family-operated fresh and frozen clam processors. Underutilization of plant capacity, increasing production costs, and numerous regulations concerning clam harvesting methods are cited by industry sources as key factors influencing profits. Labor constraints have also produced a trend toward increased mechanization.

Sea herring - While 1972 was a good year in terms of landings, production and profits, the canned sardine industry can be accurately characterized as an industry with a declining number of plants and lower production over the long run. The lack of raw product availability and foreign competition (Canada, Venezuela, South Africa, Denmark, Spain and Brazil) are and have been the reported causes of declining plant numbers and profits.

Salmon - Plant utilization in selected segments of the salmon processing segment has been as low as 15 to 20 percent in recent years. In fact, it is not difficult to isolate various processing plants that have operated only one out of three years during production seasons. This situation has produced additional concern over the resource stock. Foreign competition in the fishery, demand shifts, raw product availability and decreased production are factors influencing industry profitability.

Estimated earnings, financial characteristics and profitability by industry segment are presented in Chapter II. Industry segment categories are generally comparable to those in Chapter I, however, selected modifications were introduced as required. The chapter emphasizes the general profitability measures for the selected segments.

Table I-1. Distribution of plants by region: Bottom fish[1]

REGION[4]	PLANTS[2] LARGER THAN 80%	PERCENT OF TOTAL PLANTS	PLANTS[3] LESS THAN 80%	PERCENT OF TOTAL PLANTS	TOTAL PLANTS THIS REGION	PERCENT OF TOTAL PLANTS
1. NORTH EAST.....	40	17.86	11	4.91	51	22.77
2. MID ATLANTIC...	24	10.71	1	0.45	25	11.16
3. CHESAPEAKE.....	5	2.23	1	0.45	6	2.68
4. S. ATLANTIC....	4	1.79	10	4.46	14	6.25
5. GULF...........	6	2.68	11	4.91	17	7.59
6. PACIFIC........	24	10.71	15	6.70	39	17.41
7. GREAT LAKES....	34	15.18	16	7.14	50	22.32
8. HAWAII.........	0	0.00	0	0.00	0	0.00
9. AM. S.& PR.....	0	0.00	0	0.00	0	0.00
0. MISSISSIPPI....	5	2.23	17	7.59	22	9.82
TOTAL	142		82		224	

[1] Includes Atlantic and Pacific bottom and selected finfish.

[2] Includes all plants where the value of bottom fish is greater than 80% of total plant sales.

[3] Includes all plants where the value of bottom fish is less than 80% of total plant sales.

[4] Does not include Alaska

Source: Data compiled from: National Marine Fisheries Service.

Table I-2. Distribution of plants by region: Fresh & frozen salmon

REGION [1]	PLANTS [2] LARGER THAN 80%	PERCENT OF TOTAL PLANTS	PLANTS [3] LESS THAN 80%	PERCENT OF TOTAL PLANTS	TOTAL PLANTS THIS REGION	PERCENT OF TOTAL PLANTS
1. NORTH EAST.....	0	0.00	0	0.00	0	0.00
2. MID ATLANTIC...	0	0.00	0	0.00	0	0.00
3. CHESAPEAKE.....	0	0.00	0	0.00	0	0.00
4. S. ATLANTIC....	0	0.00	0	0.00	0	0.00
5. GULF...........	0	0.00	0	0.00	0	0.00
6. PACIFIC........	1	11.11	8	88.89	9	100. 00
7. GREAT LAKES....	0	0.00	0	0.00	0	0.00
8. HAWAII.........	0	0.00	0	0.00	0	0.00
9. AM. S.& PR.....	0	0.00	0	0.00	0	0.00
0. MISSISSIPPI....	0	0.00	0	0.00	0	0.00
TOTAL	1		8		9	

[1] Does not include Alaska

[2] Includes all plants where the value of fresh and frozen salmon is greater than 80% of total plant sales.

[3] Includes all plants where the value of fresh and frozen salmon is less than 80% of total plant sales.

Data compiled from:

Source: National Marine Fisheries Service.

Table I-3. Distribution of plants by region: Canned salmon

Region[1]	Plants[2] Larger Than 80%	Percent of Total Plants	Plants[3] Less Than 80%	Percent of Total Plants	Total Plants This Region	Percent of Total Plants
1. Pacific	9	40.90	13	59.10	22	100.00
TOTAL	9		13		22	

[1] Does not include Alaska

[2] Includes all plants where the value of canned salmon is greater than 80% of total plant sales.

[3] Includes all plants where the value of canned salmon is less than 80% of total plant sales.

Data compiled from:
Source: National Marine Fisheries Service

Table I-4. Distribution of plants by region: Oysters Pacific, fresh and frozen

REGION[1]	PLANTS[2] LARGER THAN 80%	PERCENT OF TOTAL PLANTS	PLANTS[3] LESS THAN 80%	PERCENT OF TOTAL PLANTS	TOTAL PLANTS THIS REGION	PERCENT OF TOTAL PLANTS
1. NORTH EAST.....	0	0.00	0	0.00	0	0.00
2. MID ATLANTIC...	0	0.00	0	0.00	0	0.00
3. CHESAPEAKE.....	0	0.00	0	0.00	0	0.00
4. S. ATLANTIC....	0	0.00	0	0.00	0	0.00
5. GULF...........	0	0.00	0	0.00	0	0.00
6. PACIFIC........	32	84.21	6	15.79	38	100.00
7. GREAT LAKES....	0	0.00	0	0.00	0	0.00
8. HAWAII.........	0	0.00	0	0.00	0	0.00
9. AM. S.& PR.....	0	0.00	0	0.00	0	0.00
0. MISSISSIPPI....	0	0.00	0	0.00	0	0.00
TOTAL	32		6		38	

[1] Does not include Alaska.

[2] Includes all plants where the value of fresh and frozen oysters is greater than 80% of total plant sales.

[3] Includes all plants where the value of fresh and frozen oyster is less then 80% of total plant sales.

Data compiled from:
Source: National Marine Fisheries Service.

Table I-5. Distribution of plants by region: Eastern oysters, fresh and frozen

REGION[1]	PLANTS[2] LARGER THAN 80%	PERCENT OF TOTAL PLANTS	PLANTS[3] LESS THAN 80%	PERCENT OF TOTAL PLANTS	TOTAL PLANTS THIS REGION	PERCENT OF TOTAL PLANTS
1. NORTH EAST.....	1	0.25	0	0.00	1	0.25
2. MID ATLANTIC...	13	3.19	1	0.25	14	3.44
3. CHESAPEAKE.....	126	30.96	28	6.88	154	37.84
4. S. ATLANTIC....	36	8.85	5	1.23	41	10.07
5. GULF...........	159	39.07	35	8.60	194	47.67
6. PACIFIC........	1	0.25	0	0.00	1	0.25
7. GREAT LAKES....	0	0.00	0	0.00	0	0.00
8. HAWAII.........	0	0.00	0	0.00	0	0.00
9. AM. S.& PR.....	0	0.00	0	0.00	0	0.00
0. MISSISSIPPI....	2	0.49	0	0.00	2	0.49
TOTAL	338		69		407	

[1] Does not include Alaska

[2] Includes all plants where the value of fresh and frozen oyster is greater than 80% of total plant sales.

[3] Includes all plants where the value of fresh and frozen oyster is less than 80% of total plant sales.

Data compiled from:
Source: National Marine Fisheries Service.

Table I-6. Distribution of plants by region: Oysters Pacific, canned

Region[1]	Plants[2] Larger Than 80%	Percent of Total Plants	Plants[3] Less Than 80%	Percent of Total Plants	Total Plants This Region	Percent of Total Plants
1. North East	0	0.00	0	0.00	0	0.00
2. Mid Atlantic						
3. Chesapeake						
4. S. Atlantic						
5. Gulf						
6. Pacific	1	33.33	2	66.67	3	100.0
7. Great Lakes						
8. Hawaii						
9. Am. S. & PR.						
10. Mississippi	0	0.00	0	0.00	0	0.00
TOTAL	1		2		3	

[1] Does not include Alaska

[2] Includes all plants where the value of canned oyster is greater than 80% of total plant sales.

[3] Includes all plants where the value of canned oyster is less than 80% of total plant sales.

Data compiled from:
Source: National Marine Fisheries Service.

Table I-7. Distribution of plants by region: Oysters Eastern, Canned

REGION[1/]	PLANTS[2/] LARGER THAN 80%	PERCENT OF TOTAL PLANTS	PLANTS[3/] LESS THAN 80%	PERCENT OF TOTAL PLANTS	TOTAL PLANTS THIS REGION	PERCENT OF TOTAL PLANTS
1. NORTH EAST.....	0	0.00	0	0.00	0	0.00
2. MID ATLANTIC...	0	0.00	0	0.00	0	0.00
3. CHESAPEAKE.....	0	0.00	0	0.00	0	0.00
4. S. ATLANTIC....	1	6.25	1	6.25	0	0.00
5. GULF...........	3	18.75	11	68.75	2	12.50
6. PACIFIC........	0	0.00	0	0.00	14	87.50
7. GREAT LAKES....	0	0.00	0	0.00	0	0.00
8. HAWAII.........	0	0.00	0	0.00	0	0.00
9. AM. S.& PR.....	0	0.00	0	0.00	0	0.00
0. MISSISSIPPI....	0	0.00	0	0.00	0	0.00
TOTAL	4		12		0 16	0.00

[1/] Does not include Alaska

[2/] Includes all plants where the value of canned oyster is greater than 80% of total plant sales.

[3/] Includes all plants where the value of canned oyster is less than 80% of total plant sales.

Data compiled from:
Source: National Marine Fisheries Service.

Table I-8. Distribution of plants by region: Clams, Frozen and fresh

REGION[1]	PLANTS[2] LARGER THAN 80%	PERCENT OF TOTAL PLANTS	PLANTS[3] LESS THAN 80%	PERCENT OF TOTAL PLANTS	TOTAL PLANTS THIS REGION	PERCENT OF TOTAL PLANTS
1. NORTH EAST.....	47	41.59	8	7.08	55	48.67
2. MID ATLANTIC...	9	7.96	10	8.85	19	16.81
3. CHESAPEAKE.....	11	9.73	20	17.70	31	27.43
4. S. ATLANTIC....	0	0.00	5	4.42	5	4.42
5. GULF...........	0	0.00	1	0.88	1	0.88
6. PACIFIC........	0	0.00	2	1.77	2	1.77
7. GREAT LAKES....	0	0.00	0	0.00	0	0.00
8. HAWAII.........	0	0.00	0	0.00	0	0.00
9. AM. S.& PR.....	0	0.00	0	0.00	0	0.00
0. MISSISSIPPI....	0	0.00	0	0.00	0	0.00
TOTAL	67		46		113	

[1] Does not include Alaska

[2] Includes all plants where the value of fresh and frozen clams is greater than 80% of total plant sales.

[3] Includes all plants where the value of fresh and frozen clams is less than 80% of total plant sales.

Data compiled from:
Source: National Marine Fisheries Service.

Table I-9. Distribution of plants by region: Clams canned

REGION[1]	PLANTS[2] LARGER THAN 80%	PERCENT OF TOTAL PLANTS	PLANTS[3] LESS THAN 80%	PERCENT OF TOTAL PLANTS	TOTAL PLANTS THIS REGION	PERCENT OF TOTAL PLANTS
1. NORTH EAST.....	0	0.00	2	15.38	2	15.38
2. MID ATLANTIC...	1	7.69	6	46.15	7	53.85
3. CHESAPEAKE.....	0	0.00	2	15.38	2	15.38
4. S. ATLANTIC....	0	0.00	0	0.00	0	0.00
5. GULF...........	0	0.00	0	0.00	0	0.00
6. PACIFIC........	0	0.00	2	15.38	2	15.38
7. GREAT LAKES....	0	0.00	0	0.00	0	0.00
8. HAWAII.........	0	0.00	0	0.00	0	0.00
9. AM. S.& PR.....	0	0.00	0	0.00	0	0.00
0. MISSISSIPPI....	0	0.00	0	0.00	0	0.00
TOTAL	1		12		13	

[1] Does not include Alaska

[2] Includes all plants where the value of canned clams is greater than 80% of total plant sales.

[3] Includes all plants where the value of canned clams is less than 80% of total plant sales.

Data compiled from:

Source: National Marine Fisheries Service.

Table I-10. Distribution of plants by region: Fish Meal[1]

REGION[2]	PLANTS[3] LARGER THAN 80%	PERCENT OF TOTAL PLANTS	PLANTS[4] LESS THAN 80%	PERCENT OF TOTAL PLANTS	TOTAL PLANTS THIS REGION	PERCENT OF TOTAL PLANTS
1. NORTH EAST.....	2	5.26	2	5.26	4	10.53
2. MID ATLANTIC...	0	0.00	1	2.63	1	2.63
3. CHESAPEAKE.....	0	0.00	2	5.26	2	5.26
4. S. ATLANTIC....	4	10.53	4	10.53	8	21.05
5. GULF...........	0	0.00	11	28.95	11	28.95
6. PACIFIC........	3	7.89	7	18.42	10	26.32
7. GREAT LAKES....	1	2.63	0	0.00	1	2.63
8. HAWAII.........	0	0.00	0	0.00	0	0.00
9. AM. S.& PR.....	0	0.00	0	0.00	0	0.00
0. MISSISSIPPI....	0	0.00	1	2.63	1	2.63
TOTAL	10		28		38	

[1] Includes both Menhaden and Anchovy plants.

[2] Does not include Alaska

[3] Includes all plants where the value of fish meal is greater than 80% of total plant sales.

[4] Includes all plants where the value of fish meal is less than 80% of total plant sales.

Data compiled from:
Source: National Marine Fisheries Service.

Table I-11. Distribution of plants by region: Sea Herring, canned (Maine Sardines)

REGION[1]	PLANTS[2] LARGER THAN 80%	PERCENT OF TOTAL PLANTS	PLANTS[3] LESS THAN 80%	PERCENT OF TOTAL PLANTS	TOTAL PLANTS THIS REGION	PERCENT OF TOTAL PLANTS
1. NORTH EAST.....	16	88.89	2	11.11	18	*****
2. MID ATLANTIC...	0	0.00	0	0.00	0	0.00
3. CHESAPEAKE.....	0	0.00	0	0.00	0	0.00
4. S. ATLANTIC....	0	0.00	0	0.00	0	0.00
5. GULF...........	0	0.00	0	0.00	0	0.00
6. PACIFIC........	0	0.00	0	0.00	0	0.00
7. GREAT LAKES....	0	0.00	0	0.00	0	0.00
8. HAWAII.........	0	0.00	0	0.00	0	0.00
9. AM. S.& PR.....	0	0.00	0	0.00	0	0.00
0. MISSISSIPPI....	0	0.00	0	0.00	0	0.00
TOTAL	16		2		18	

[1] Does not include Alaska

[2] Includes all plants where the value of sea herring is greater than 80% of total plant sales.

[3] Includes all plants where the value of sea herring is less than 80% of total plant sales.

Data compiled from:
Source: National Marine Fisheries Service.

Table I-12. Summary of number of plants by select species.

Industry Segment	Number of plants 80 percent of sales by select species	Number of Alaskan plants by select species
Fish Meal	22	
Salmon F&F	1	
Alaskan Salmon F&F		31
Alaskan Salmon, canned		59
Salmon canned	9	
Bottomfish	142	
Alaskan Bottomfish		1
Clams, F&F	67	
Clams, canned	1	
Oysters Pacific, F&F	32	
Oysters Eastern, F&F	338	
Oysters Pacific, canned	1	
Oysters Eastern, canned	4	
Sea Herring, fillets	2	
Sea Herring, canned	16	
TOTAL	635	91

Table I- 13. Geographic concentration of selected segments of the seafood processing industry, 1972.

Segment	Area of Concentration	Number of plants by location	Population of Host city
Sea Herring (Maine Sardines)	Lubec, Maine	4	950
	Eastport, Maine	3	1,989
	Milbridge, Maine	2	500
Menhaden	Beauford, N.C.	5	3,368
	Cameron, La.	4	950
	Empire, La.	3	600
	Biloxi, Miss.	3	48,486
	Abbeville, La.	2	10,996
	Reedville, Va.	2	400
Atlantic Bottom fish	New Bedford, Mass.	12	101,777
	Fairhaven, Mass.	9	16,332
	Delcambre, La.	4	1,975
Clams (East Coast)	Port Norris, N. J.	5	1,955
	Addison, Maine	3	250
	Stockton Springs, Maine	3	400
	Ipswich, Mass.	3	10,750
	Rowley, Mass.	3	3,040
	Chincoteaque, Va.	3	1,897
	Wildwood, N. J.	2	4,110
	Vineland, N. J.	2	47,399
	Essex, Mass.	2	637,887
	Easton, Md.	2	6,809
Oysters (East Coast)	Apalachicola, Fla.	20	3,102
	Biloxi, Miss.	18	48,486
	Coden, Ala.	17	500
	Eastpoint, Fla.	17	1,118
	Crisfield, Md.	13	3,078
	New Orleans, La.	14	593,471
	Weems, Va.	6	250
	Seabrook, Tx.	6	3,811
	Bon Secour, Ala.	6	600

continued.....

Table I-13. Geographic concentration of selected segments of the seafood processing industry, 1972 (continued)

Segment	Area of Concentration	Number of plants by location	Population of Host city
Oysters (West Coast)	Shelton, Wa.	8	6,515
	Olympia, Wa.	4	23,111
	Newport, Ore.	2	5,188
	Ocean Park, Wa.	2	825
Anchovy Reduction	Terminal Island, Ca.	6	None[1/]
Canned Salmon	Kodiak, Alaska	10	3,798
	Petersburg, Alaska	4	2,042
	Astoria, Ore.	3	10,244
	Naknek, Alaska	3	178
	Egegik, Alaska	3	138

Source: National Marine Fisheries Service Plant List.

1/ Terminal Island is an industrial area only.

Table I-14. Number and size of U. S. seafood processing plants, 1970 and 1972 [1]

Size Class	1970		1972	
	No. of Plants	Percent of Total	No. of Plants	Percent of Total
Up to $25,000 [2]	414	24.8	309	19.4
$25,000 to $99,999	401	24.0	364	22.9
$100,000 to $199,999	233	13.9	232	14.6
$200,000 to $299,999	128	7.7	144	9.2
$300,000 to $399,999	81	4.8	65	4.1
$400,000 to $499,999	45	2.7	61	3.8
$500,000 to $749,999	76	4.5	91	5.7
$750,000 to $999,999	53	3.2	54	3.4
$1,000,000 to $1,499,999	65	3.9	54	3.4
$1,500,000 to $2,499,999	65	3.9	81	5.1
$2,500,000 to $4,999,999	46	2.8	52	3.3
$5,000,000 to $9,999,999	34	2.0	39	2.4
$10,000,000 and over	31	1.8	43	2.7
Totals	1,672	100.0	1,589	100.0

[1] Does not include Alaska.

[2] Dollar values are F.O.B. plant.

Source: National Marine Fisheries Service.

Table I-15. Concentration of fish and shellfish processing, 1972

Plants[1]	Value [2]	Percent of Total
	($1,000)	
4 largest plants	354,457	16.8
8 " "	511,097	24.3
10 " "	582,128	27.6
20 " "	850,548	40.4
30 " "	1,028,340	48.8
40 " "	1,158,258	55.0
50 " "	1,254,354	59.6
60 " "	1,329,898	63.2
70 " "	1,393,757	66.2
80 " "	1,447,774	68.8
90 " "	1,496,381	71.1
100 " "	1,538,204	73.1
125 " "	1,615,279	76.7
150 " "	1,675,015	79.6
175 " "	1,725,680	82.0
200 " "	1,769,109	84.0
Total all plants		
1,589[3]	2,105,290	100.0

[1] Ranking is by individual plant rather than by companies.

[2] F.O.B. Plant.

[3] Does not include Alaska.

Source: National Marine Fisheries Service.

Table I - 16 . Percent of total value of shipments accounted for by:

Specie and Product Line	4 Largest Companies	8 Largest Companies	20 Largest Companies	50 Largest Companies	Total No. of Plants in seg.
	%				
Fish Meal	47	65	93		38
Oysters Pacific F & F	51	69	95		38
Oysters Eastern	6	11	24	45	411
Clams Canned	93	99			13
Oysters East	56	82			16
Clams F & F	27	43	66	89	113
Bottom Fish	16	28	51	75	224
Oysters Western	100	0	0	0	3
Sea Herring	37	64			18
Salmon F & F	88	100			9

---

[1] Rounding to nearest whole percent.

Table I-17. Number and size of U.S. Canned Sea Herring processing plants, 1972

	Number of[1] Plants	Percent of total sales	Percent of total plants
$0 to $25,000	0	0.0	0.0
$25,000 to $99,000	0	0.0	0.0
$100,000 to $199,999	0	0.0	0.0
$200,000 to $299,999	0	0.0	0.0
$300,000 to $399,999	0	0.0	0.0
$400,000 to $499,999	0	0.0	0.0
$500,000 to $749,999	2	4.84	11.11
$750,000 to $999,999	2	7.39	11.11
$1,000,000 to $1,499,999	6	30.08	33.33
$1,500,000 to $2,499, 999	6	44.29	33.33
$2,500,000 to $4,999,999	0 [1]	0.0 [1]	0.0 [1]
$5,000,000 to $9,999,999	0	0.0	0.0
$10,000,000 and Over	0	0.0	0.0
TOTAL	18	100.0	100.0

---

[1] Several plants in this and larger size classes have been deleted to avoid disclosure. Columns will, therefore, not total.

Table I-18. Number and size of U.S. fish meal processing plants, 1972.

Size class	Number of Plants 1/	Percent of total sales	Percent of total plants
$0 to $25,000	4	0.10	10.53
$25,000 to $99,000	5	0.48	13.16
$100,000 to $199,999	3	0.85	7.89
$200,000 to $299,999	0	0.0	0.0
$300,000 to $399,999	2	1.11	5.26
$400,000 to $499,999	0	0.0	0.0
$500,000 to $749,999	2	2.34	5.26
$750,000 to $999,999	4	6.31	10.53
$1,000,000 to $1,499,999	6	12.99	15.79
$1,500,000 to $2,499,999	5	18.80	13.16
$2,500,000 to $4,999,999	4	23.46	10.53
$5,000,000 to $9,999,999	0	0.0	0.0
$10,000,000 and Over	0	0.0	0.0
TOTAL	38	100.0	100.0

1/ Several plants have been deleted to avoid disclosures. Columns will, therefore, not total.

Table I-19. Number and size of U.S. Eastern Oysters fresh and frozen processing plants, 1972

Size class	Number of Plants[1]	Percent of total sales	Percent of total plants
$0 to $25,000	135	3.17	33.09
$25,000 to $99,000	126	15.61	30.90
$100,000 to $199,999	71	23.53	17.52
$200,000 to $299,999	38	20.23	9.25
$300,000 to $399,999	17	12.94	4.14
$400,000 to $499,999	12	11.95	2.92
$500,000 to $749,999	8	10.56	1.95
$750,000 to $999,999	0	0.00	0.00
$1,000,000 to $1,499,999	0	0.00	0.00
$1,500,000 to $2,499,999	0	0.00	0.00
$2,500,000 to $4,999,999	0	0.00	0.00
$5,000,000 to $9,999,999	0	0.00	0.00
$10,000,000 and Over	0	0.00	0.00
TOTAL	407	100.01	100.00

[1] Several plants have been deleted to avoid disclosure. Columns will, therefore, not total.

Table I-20. Number and size of U.S. clams, fresh and frozen processing plants, 1972

Size class	Number of[1] Plants	Percent of total sales	Percent of total plants
$0 to $25,000	26	1.32	23.01
$25,000 to $99,000	39	10.17	34.51
$100,000 to $199,999	21	14.27	18.58
$200,000 to $299,999	10	12.10	8.85
$300,000 to $399,999	6	10.08	5.31
$400,000 to $499,999	0	0.0	0.0
$500,000 to $749,999	5	16.22	4.42
$750,000 to $999,999	3	13.86	2.65
$1,000,000 to $1,499,999	0	0.00	0.00
$1,500,000 to $2,499,999	2	16.13	1.77
$2,500,000 to $4,999,999	0	0.0	0.0
$5,000,000 to $9,999,999	0	0.0	0.0
$10,000,000 and Over	0	0.0	0.0
TOTAL	113	100.0	100.0

---

[1] Several plants have been deleted to avoid disclosure. Columns will, therefore, not total.

Table I-21. Number and size of U.S. bottomfish processing plants, 1972.

Size class	Number of Plants 1/	Percent of total sales	Percent of total plants
$0 to $25,000	51	0.63	22.77
$25,000 to $99,000	46	3.47	20.54
$100,000 to $199,999	43	8.17	19.20
$200,000 to $299,999	25	8.23	11.16
$300,000 to $399,999	13	6.31	5.80
$400,000 to $499,999	4	2.44	1.79
$500,000 to $749,999	17	13.76	7.59
$750,000 to $999,999	5	5.97	2.23
$1,000,000 to $1,499,999	9	16.36	4.02
$1,500,000 to $2,499, 999	9	24.44	4.02
$2,500,000 to $4,999,999	2	10.21	0.89
$5,000,000 to $9,999,999	0	0.0	0.0
$10,000,000 and Over	0	0.0	0.0
TOTAL	224	100.0	100.0

1/ Several plants have been deleted to avoid disclosure. Columns will therefore, not total.

Table I-22. Economic concentration & integration of selected salmon processing companies

Company Name	Plants Location	Products
Alaska Packers Assoc. Inc. (Subs. Del Monte)	Chiqnik, Alaska	Canned salmon
	Egegik, Alaska	Canned salmon
	Kodiak, Alaska	Canned salmon
	Larsen Bay, Alaska	Canned salmon
	Naknek, Alaska	Canned salmon
Alaskan Seafoods Inc.	Homer, Alaska	Crab Halibut Herring Herring roe Salmon Shrimp
Booth Fisheries (Div. Consolidated Foods Inc.)	Throughout the U.S.	Canned sardines
		Canned scallops
	Canada	Canned tuna
	Mexico	Frozen: clams
	Nicaragua	Crabs, fish stick
	France	Flounder
	Orient	Haddock, halibut herring, lobster, etc.
Bumble Bee Seafoods (Div. Castle & Cook, Inc.)	Astoria, Ore.	Canned: shad roe, tuna, Alaska king crab, pet foods Frozen: dungeness crab Canned & Frozen: Salmon, shad, shrimp, sturgeon
	Cambridge, Md.	Canned: tuna, pet foods
	Honolulu, Hawaii	Canned: tuna, pet foods
	Bellingham, Wash.	Canned salmon
	Naknek, Alaska	Canned salmon
	Paramaribo, Surinam	Frozen
	South America	Shrimp

continued.....

Table I-22. Economic concentration & integration of selected salmon processing companies (continued)

Company	Plant Location	Products
Carnation Seafoods Oceans of the World Eastern Inc.	New York, N. Y.	Frozen: clams cod, crab, fish sticks, flounder, haddock, halibut lobster, oysters, perch, salmon, scallops, shrimp
Jolly Roger Seafoods	Nahcotta, Wash.	Canned: oyster stew Frozen: clams, crabs, halibut, salmon, scallops, shrimp Canned & Frozen: crab, sturgeon, canned, Glass & Frozen oysters
Kadiak Fisheries Co.	Seattle, Wash.	Canned: salmon, crabmeat
King Salmon Inc.	Westport, Wash.	Canned & Frozen: clams, crabmeat, salmon, frozen dungeness crab, herring
Lazio Fish Co., Inc.	Eureka, Calif.	Canned: dungeness crabmeat, salmon, shrimp, tuna
New England Fish Co.	Chatham, Alaska Egegik, Alaska Ketchikan, Alaska Nakeen, Alaska Orca, Pederson Point, Sunny Point, Sand Point, Waterfall, Alaska Anacortes, Wash. La Conner, La Push, Wash. Warrenton, Oregon Newport, Oregon Miami, Fla.	Canned: salmon, shrimp, tuna, mackerel Frozen: Alaska king crab, dungeness crab, cod, fish sticks, flounder haddock, halibut lobsters, oysters, perch, scallops, salmon, shad roe, shrimp, breaded & prepared seafood items

continued.....

Table I-22. Economic concentration & integration of selected salmon processing companies (continued)

Company	Plants Location	Product
Pan-Alaska Fisheries Inc.	Monroe, Wash.	Frozen: dungeness crab, halibut, salmon, shrimp,
	Unalaska, Alaska	Frozen: crabmeat, salmon
	Kodiak, Alaska	Frozen: cod, crab, oysters, perch, salmon
Whitney-Fidalgo Seafoods Inc.	Seattle, Wash.	Frozen: clams, cod, crab, flounder, halibut, herring, shrimp, perch, tuna, canned & frozen salmon
	Anchorage, Alaska	Canned salmon
	Ketchikan, Alaska	canned salmon
	Kodiak, Alaska	canned crab & salmon
	Naknek, Alaska	canned salmon
	Petersburg, Alaska	Frozen: halibut, herring roe, canned & frozen: crab, salmon, shrimp
	Port Graham, Alaska	Canned salmon Frozen herring roe
	Uyak, Alaska	Canned salmon Frozen herring roe

Source: Judge, Edward E., The Directory of the Canning, Freezing, Preserving Industries, 1972-73.

Table 1-23. Oysters - Landings by region, 1964-1973

	New England		Mid-Atlantic		Chesapeake		S. Atlantic		Gulf		Pacific		Total	
Year	Quant.	Value	Quant.	Value	Quant.	Value	Quant.	Value	Quant.	Value	Quant.	Value	Quant.	Value
	mls. lbs	mls $	mils lbs	mils $	mils lbs	mils $	mils lbs	mils $	mils lbs	mils $	mils lbs	mils $	mils lbs	mils $
1964	.195	.326	1.36	1.37	22.10	15.81	3.53	1.51	23.39	6.27	9.97	2.65	60.53	27.93
1965	.340	.652	.757	1.06	21.19	16.70	4.08	1.51	19.16	5.71	9.17	2.23	54.69	27.87
1966	.408	.849	.917	1.17	21.23	14.54	3.66	1.58	17.18	6.49	7.83	2.75	51.22	27.37
1967	.323	.746	1.19	1.17	25.80	17.32	3.16	1.35	21.75	8.49	7.74	3.17	59.56	32.24
1968	.195	.456	1.54	1.49	22.68	15.26	2.97	1.53	26.74	10.27	7.77	3.00	61.89	32.01
1969	.152	.358	1.32	1.35	22.16	14.00	1.83	1.08	19.77	8.15	6.97	2.61	52.20	27.57
1970	.190	.403	1.41	1.76	24.67	15.08	1.63	.974	17.71	7.54	7.99	3.72	53.60	29.49
1971 1/													54.59	30.43
1972 1/													52.55	33.82
1973 1/													48.55	35.19

1/ Source: Fishery Statistics of U.S., 1973.

Source: Fishery Statistics of the U.S., 1964-1970

Table I-24. Oysters-processed product, United States, 1964-1972

	Fresh & Frozen								Canning Plants 2/
	Shucked		Steamed		Specialties		Canned 1/		
Year	Mils. lbs.	Mils. $	Mils. lbs.	Mils. $	Mils. lbs.	Mils. $	Mils. cases	Mils. $	Number
1964	46.11	35.26	.98	2.16	4.17	3.67	.538	7.46	(28)
1965	39.64	31.70	.61	1.34	4.42	3.38	.443	6.13	(21)
1966	38.41	32.46	.70	1.53	4.26	3.72	.484	7.22	(20)
1967	40.25	34.78	.852	1.41	5.00	4.60	.573	10.12	(22)
1968	43.14	38.99	1.00	2.03	5.96	5.44	.531	9.37	(22)
1969	42.70	38.62	--	--	4,87	5.00	.313	5.13	(16)
1970	46.55	41.81	--	--	5.72	5.36	.543	7.28	(12)
1971	48.39	47.66	.672	1.29	4.71	4.76	.694	9.37	(18)
1972							.658	11.35	(19)

1/ Includes both regular pack and specialties.

2/ Regular processing and does not include specialties due to uncertainty of duplication.

Source: Fishery Statistics of the U. S., 1964-1970, Canned Fish Products, 1972 (Prelim.), Processed Fish Prod., 1971.

Table I-25. Oysters, imports for consumption, 1963-1972

	Fresh & Frozen						Canned		Imports	
	Except seed oysters		Unclassified (Prin. seed oysters)		Total		Oysters & Oyster Juice		Total	
Year	Quant.	Value	Quant.	Value	Quant.	Value	Quant.	Value	Quant.	Value
	mils lbs	mils $	mils lbs	mils $	mils lbs	mils $	mils lbs	mils $	mils lbs	mils $
1963	1.380	.605	5.437	.469	6.817	1.074	8.463	3.101	15.280	4.175
1964	.991	.444	4.016	.497	5.007	.941	7.969	2.876	12.976	3.817
1965	1.290	.617	3.737	.416	5.027	1.033	8.638	3.225	13.665	4.258
1966	1.138	.560	1.973	.313	3.111	.873	12.015	4.494	15.126	5.367
1967	3.581	1.067	4.256	.827	7.837	1.894	16.114	5.845	23.951	7.739
1968	2.754	.888	2.102	.625	4.856	1.513	14.499	5.640	19.355	7.153
1969	1.429	.946	1.350	.550	2.779	1.496	16.720	6.373	19.499	7.869
1970	2.104	1.216	1.717	.481	3.821	1.697	14.953	8.140	18.774	9.837
1971	1.206	.855	.921	.479	2.127	1.334	9.452	6.545	11.579	7.879
1972	1.960	1.842	1.934	.237	3.894	2.079	20.848	13.763	24.742	15.842

Source: Fishery Statistics of the U.S. 1964-1970 Imports and Exports of Fishery Products-Annual Summary 1972.

Table I-26. Clams - Landings by region, 1964 - 1973

Year	New England		Mid-Atlantic		Chesapeake		S. Atlantic		Gulf		Pacific		Total	
	Quant.	Value	Quant.	Value	Quant.	Value	Quant.	Value	Quant.	Value	Quant.	Value	Quant.	Value
	------------------------- Quantities, million lbs., Value, million $ --------------------												mils lbs	mils $
1964	6.40	3.52	46.02	7.82	10.99	3.06	.402	.152	.072	.024	.589	.318	64.46	14.89
1965	6.54	3.61	52.24	9.45	10.88	3.09	.404	.171	.114	.042	.677	.370	70.85	16.73
1966	7.46	4.14	54.90	11.13	9.50	2.85	.310	.119	.004	.001	.582	.309	72.75	18.55
1967	7.17	4.14	54.52	12.92	8.55	2.93	.320	.148	.354	.036	.585	.317	71.50	20.49
1968	7.42	4.15	45.26	12.33	13.32	3.76	.289	.150	.417	.046	.535	.294	67.25	20.73
1969	8.69	4.62	52.38	14.60	17.94	5.38	.423	.210	.647	.071	.663	.360	80.75	25.24
1970	11.08	5.93	63.30	16.75	22.69	5.21	.491	.248	.770	.081	.872	.570	99.20	28.79
1971 1/													82.66	30.54
1972 1/													89.10	31.86
1973 1/													106.29	34.73

1/ Fisheries of the U.S., 1973.
Source: Fishery Statistics of the U.S., 1964-1970.

Table I-27. Clams - processed product, United States, 1964-1972

	Fresh and Frozen						
	Shucked		Specialties		Canned 1/		
Year	Quant.	Value	Quant.	Value	Quant.	Value	(Canning Plants) 2/
	(mils. lbs)	(mils. $)	(mils. lbs.)	(mils. $)	(mils. cases)	(mils. $)	Exclusive of duplication
1964	--	--	--	--	--	--	--
1965	30.529	11.144	4.199	3.052	2.626	19.263	(39)
1966	33.014	13.238	5.425	4.219	2.701	22.690	(33)
1967	34.283	14.047	6.035	5.159	2.607	23.146	(32)
1968	27.370	14.677	13.013	9.562	2.405	21.912	(29)
1969	51.739	22.171	13.507	11.524	2.445	24.044	(31)
1970	56.333	26.658	8.228	7.146	2.609	28.161	(29)
1971	61.976	28.093	7.756	6.720	2.665	28.737	(26)
1972					2.825	28.705	(24)

1/ Whole and minced, chowder, juice and specialties

2/ Excluding canned specialties

Source: Fishery Statistics of the U.S., 1964-1970, Canned Fish Products, 1972 (Prelim.), Processed Fish Products, 1971.

Table I-28. Clams, imports for consumption, 1963-1972

	Fresh and frozen In shell or shucked		Canned Total		Imports Total	
Year	Quant.	Value	Quant.	Value	Quant.	Value
	(Imports, millions of lbs or millions of $)					
1963	.469	.097	1.544	.903	2.013	1.000
1964	.411	.080	1.433	.929	1.844	1.009
1965	.573	.097	1.423	.898	1.996	.995
1966	.703	.125	1.990	1.251	2.693	1.376
1967	.708	.171	1.750	1.079	2.458	1.250
1968	.749	.271	1.887	1.111	2.636	1.382
1969	1.087	.494	2.746	1.648	3.833	2.142
1970	1.720	.819	4.634	2.966	6.354	3.785
1971	3.072	1.251	3.186	2.130	6.258	3.381
1972	2.994	1.348	4.231	3.007	7.225	4.355

Source: Fishery Statistics of the U.S. 1964-1970.
Imports and Exports of Fishery Products, Annual Summary 1972.

Table I-29. Menhaden, U. S. landings by major states, and regions, 1963-1972

Year	State Landings						Regional Landings		Total U.S. Landings
	N.J.	Va.	N.C.	Miss.	La.	Other	Atlantic	Gulf	
	Million pounds								
1963	178	256	190	250	633	309	848	968	1,816
1964	64	331	173	238	600	154	656	904	1,560
1965	74	352	161	278	682	179	703	1,023	1,726
1966	13	273	182	191	556	93	515	793	1,308
1967	46	220	150	167	510	71	464	700	1,164
1968	68	270	167	150	622	98	552	823	1,375
1969	34	178	145	225	856	108	390	1,155	1,545
1970	31	446	108	206	960	86	628	1,209	1,837
1971	60	392	80	306	1,237	115	583	1,607	2,190
1972							832	1,107	1,939
1973									1,890

Source: Menhaden, Basic Economic Indicators, N.M.F.S., U.S. Dept. Commerce, Current Fisheries Statistics, No. 5934.

DOMESTIC PRODUCTION

Table I-30. --Production of menhaden products, 1947-71

(Product-weight)

Year	Dried scrap and meal		Solubles		Oil	
	Thousand pounds	Thousand dollars	Thousand pounds	Thousand dollars	Thousand pounds	Thousand dollars
1947	197,204	10,884	-	-	63,550	11,425
1948	207,638	11,548	-	-	65,730	10,132
1949	225,282	17,773	-	-	62,204	3,408
1950	206,520	12,856	-	-	76,575	5,867
1951	230,852	13,878	-	-	94,028	9,771
1952	287,936	17,845	-	-	96,665	5,785
1953	349,504	21,767	78,076	3,593	133,684	8,806
1954	366,182	23,783	112,547	5,565	139,811	9,755
1955	381,256	25,458	123,877	4,397	159,241	12,195
1956	421,164	27,440	145,705	5,340	168,211	14,092
1957	344,776	21,726	138,797	5,615	118,484	9,466
1958	316,148	20,699	144.942	6,253	127,986	9,434
1959	447,786	26,392	216,159	5,853	154,712	10,743
1960	436,846	19,202	131,700	2,299	183,403	11,582
1961	495,102	25,852	146,610	3,142	235,167	12,913
1962	479,414	28,250	170,400	4,120	232,619	10,060
1963	368,410	22,263	149,662	4,486	167,634	9,853
1964	320,698	20,001	137,476	4,055	157,730	11,735
1965	351,918	25,869	146,360	4,666	175,204	13,241
1966	269,908	20,539	121,538	3,725	144,198	10,982
1967	238,270	15,265	103,540	3,080	101,384	4,736
1968	286,308	19,534	106,494	2,669	152,020	6,247
1969	318,986	26,960	126,534	3,069	149,155	8,253
1970	377,100	34,658	143,782	3,574	186,283	16,833
1971	442,008	34,969	182,482	3,773	242,071	19,268

Source: Fishery Statistics of the United States, various years and Industrial Fishery Products, 1970-71.

Table I-31. U.S. production of dried fish scrap and meal, solubles and manhaden oil, 1963-1972

	Dried Scrap and Meal			Solubles[1]			Menhaden
Year	Menhaden	Other	Total	Menhaden	Other	Total	Oil
	Million pounds						
1963	368	144	512	75	32	107	168
1964	321	150	471	69	24	93	158
1965	352	156	508	73	22	95	175
1966	270	178	448	61	22	83	144
1967	238	204	442	52	23	75	101
1968	286	184	470	53	19	72	152
1969	319	186	505	64	18	82	149
1970	377	161	538	72	23	95	186
1971	442	143	585	91	10	101	242
1972	387	174	561	104	30	134	167
1973	378					137	200

[1] Dry weight.

Source: Menhaden, Basic Economic Indicators, N. M. F. S., U.S. Dept. Commerce, Current Fisherty Statistics No. 5934.

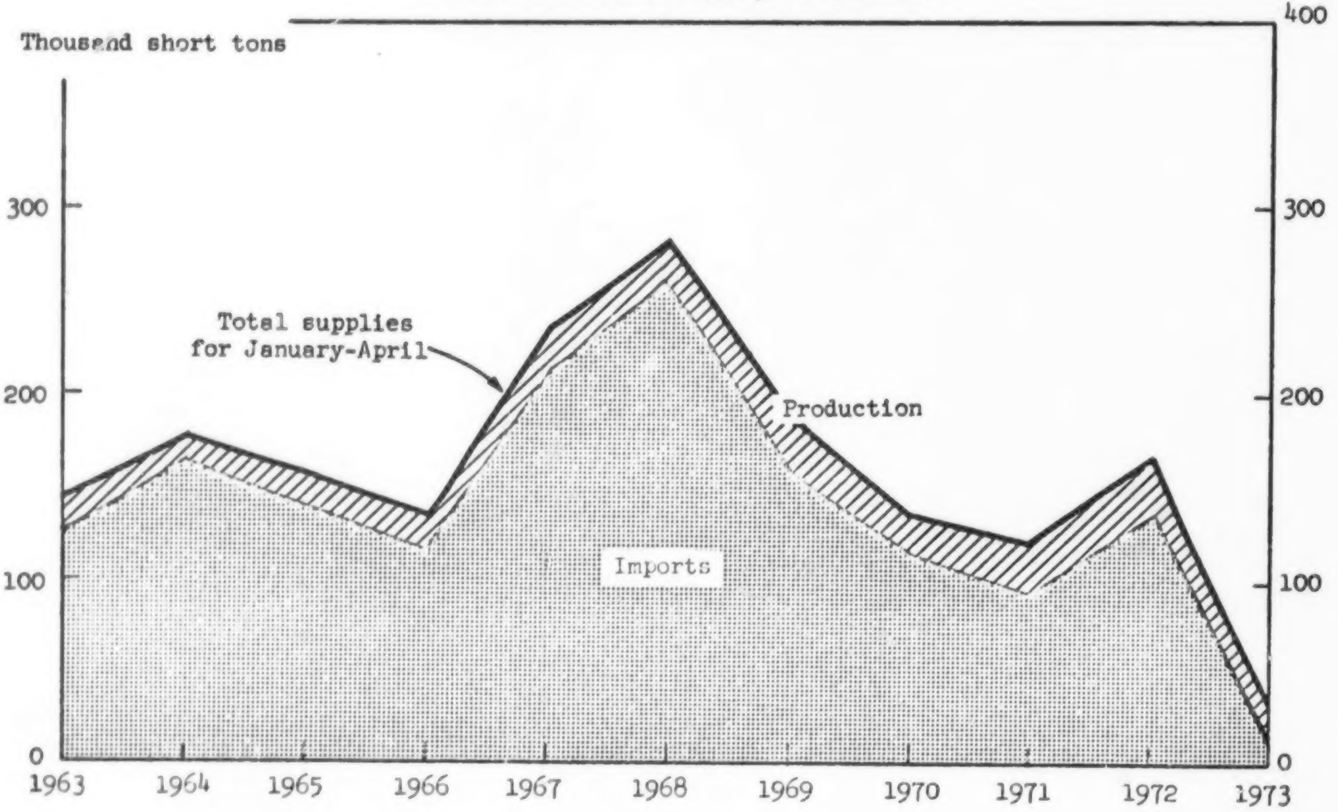
Table I-32. Foreign trade dried fish scrap and meal, solubles and fish and marine animal oil[1] 1963-1972

	Dried scrap & meal			Solubles			Oil	
Year	U. S. Prodn. Mils. lbs.	Imports Mils. lbs.	% Imported %	U. S. Prodn. Mils. lbs.	Imports Mils. lbs.	% Imported %	U. S. Prodn. Mils. lbs.	Exports Mils. lbs.
1963	512	753	60	107	7	7	186	262
1964	471	878	65	93	6	6	180	152
1965	508	541	52	95	5	5	195	104
1966	448	896	67	83	4	5	164	77
1967	442	1,303	75	75	4	5	122	77
1968	470	1,711	78	72	1	1	174	65
1969	505	717	59	82	-	-	170	199
1970	538	503	48	95	-	-	206	159
1971	585	566	49	101	1	1	265	230
1972	571	784	58	134	-	-	188	193

---

[1] Source: Menhaden, Basic Economic Indicators, UMFS, U.S. Dept. Commerce, Current Fishery Statistics No. 5934, and where exports exceed production, it is assumed that additional supplies came from previous year's stocks.

U.S. PRODUCTION, IMPORTS, AND TOTAL SUPPLIES OF FISH MEAL, JANUARY-APRIL, 1963-73



NOAA Market Research and Services Division NMFS

Figure 1

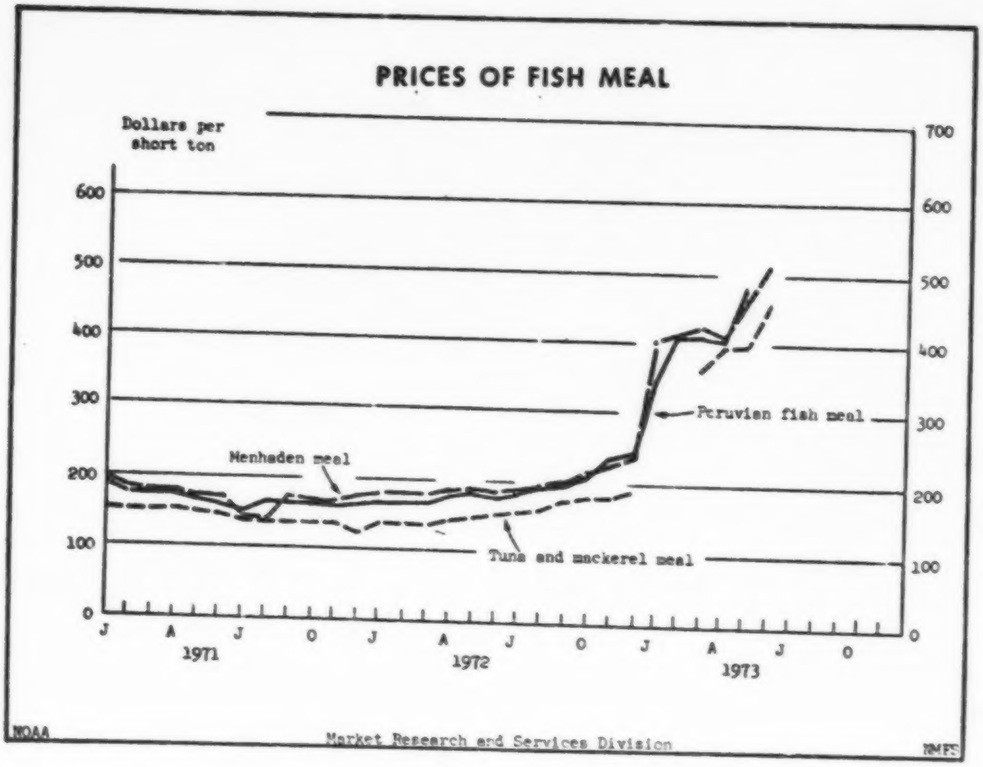

PRICES OF FISH MEAL
Dollars per short ton
600
500
400
300
200
100
0
700
600
500
400
300
200
100
0
Menhaden meal
Peruvian fish meal
Tuna and mackerel meal
J
A
J
O
J
A
J
O
J
A
J
O
1971
1972
1973
NOAA
Market Research and Services Division
NMFS

Figure 2

Table I- 33. Anchovies - landings and processed product, California, 1964-1973

Year	Meal & Scrap		Oil		California Landings	
	Quant. Tons	Value $	Quant. (000 Lbs.)	Value $	Quant. Mils. lbs.	Value Mil. $
1964	(1)	(1)	(1)	(1)	4.98	.082
1965	(1)	(1)	409	1,208	5.73	.099
1966	4,468	675,748	773	56,608	62.28	.644
1967	5,575	722,475	1,004	39,051	69.61	.701
1968	2,762	336,523	899	32,304	31.08	.284
1969	11,436	1,738,195	4,861	207,416	192.49	2.157
1970	16,204	2,786,993	6,165	439,333	135.28	1.353
1971	7,718	1,195,465	3,169	175,702	88.00	.969
1972					149.07	1.763
1973					229.206	5.253

---

[1] Included in unclassified products.

Source: Fishery Statistics of the U.S. - 1964-1970. Processed Fishery Products, Annual Summary 1971

Table I-34. U. S. landings of Pacific salmon, by state, 1963-1972
(Round-weight)

Year	Alaska	Washington	Oregon	California	U.S. Total
	Thousand pounds				
1963	223,063	54,993	8,262	7,859	294,177
1964	311,623	21,275	9,867	9,481	352,246
1965	274,844	30,418	11,806	9,738	326,806
1966	333,325	32,367	12,373	9,447	387,512
1967	138,517	53,374	17,371	7,402	216,664
1968	285,272	25,754	9,631	6,952	327,609
1969	219,150	31,978	10,549	6,151	267,828
1970	346,465	37,601	19,442	6,611	410,119
1971					312,071
1972					216,685

Source: Salmon, Basic Economic Indicators, NMFS, U.S. Dept. Commerce, Current Fishery Statistics No. 6129.

Table I-35. U. S. salmon consumption, aggregate and per capita, canned and non-canned, 1963-1972. (Edible weight)[1]

Year	Aggregate Consumption			Per Capita Consumption		
	Canned	Non-canned[2]	Total[3]	Canned	Non-canned[2]	Total[3]
	Million pounds			Pounds		
1963	136.0	36.4	171.5	.721	.193	.910
1964	145.7	34.3	179.5	.762	.179	.939
1965	162.2	36.6	198.8	.838	.189	1.027
1966	142.2	35.5	177.8	.727	.181	.910
1967	132.1	33.8	165.9	.669	.171	.840
1968	121.4	36.2	157.7	.609	.182	.791
1969	123.8	40.8	164.8	.615	.202	.818
1970	136.6	51.1	187.7	.671	.251	.922
1971	133.3	77.3	211.3	.647	.375	1.026
1972				.700		

---

[1] Conversion factor 0.60 of round weight.

[2] Includes fresh and frozen, smoked and cured.

[3] Up to 1965 these figures do not take into account changes in smoked, filets, steaks and canned stocks, therefore, from year to year the sum of non-canned and canned figures will vary slightly from the total consumption figures. On a continuous basis these variations cancel each other out.

Source: Salmon, Basic Economic Indicators, N.M.F.S., U.S. Dept. Commerce, Current Fishery Statistics, No. 6129.

Table I-36. U. S. supply and disposition of salmon, 1963-1972

Year	Beginning Stocks [1]	Landings [2]	Imports [3]	Total Supply	Ending Stocks	Exports [4]	Apparent Consumption
	Thousand pounds						
1963	20,305	294,177	12,614	327,096	19,132	22,187	285,777
1964	19,132	352,246	10,938	382,317	23,150	59,945	299,222
1965	231,078	326,806	9,639	567,523	185,907	50,296	331,320
1966	222,387	387,512	10,895	620,794	269,880	54,553	296,361
1967	269,880	216,664	10,685	497,229	167,217	53,540	276,472
1968	167,217	327,609	19,346	514,173	223,376	27,860	262,937
1969	223,376	267,828	13,557	504,761	170,457	59,668	274,636
1970	170,457	410,119	12,475	593,051	221,415	58,830	312,806
1971	221,415	312,071	11,747	545,233	126,624	66,524	352,085
1972							

---

[1] Beginning in 1965, includes fresh, frozen and cured, fillets and steaks, canners stocks and in 1966, includes distributors stocks of canned salmon.

[2] West Coast landings.

[3] Includes all types converted to round weights.

[4] Includes canned and fresh and frozen; also includes cured to 1965, after which cured figures were no longer reported separately. All forms converted to round weight.

Source: Salmon, Basic Economic Indicators, NMFS, U. S. Dept. Commerce, Current Fishery Statistics, No. 6129.

Table I-37. Imports of salmon to the United States, by country of origin, 1963-1972.
(Round-weight equivalent)

Year	Canada			Japan				
	Fresh & Frozen 1/	Canned	Total	Fresh & Frozen 2/	Canned	Total	Other	Total
	Thousand pounds							
1963	10,287	838	11,125	713	494	1,207	282	12,614
1964	10,519	2	10,521	347	12	359	58	10,938
1965	9,321	106	9,427	38	20	58	154	9,639
1966	9,978	93	10,071	774	20	794	30	10,895
1967	10,475		10,475	157		157	53	10,685
1968	11,601	6,208	17,809	188	1,301	1,489	48	19,346
1969	10,100	2,529	12,629	3	822	825	103	13,557
1970	8,603	2,274	10,877	120	1,392	1,512	86	12,475
1971	9,234	2,060	11,294	815	616	1,431	22	12,747
1972		4,756			6,838		2	11,596

1/ Includes some smoked and cured.

2/ Less than 500 pounds.

Source: Salmon, Basic Economic Indicators, NMFS, U. S. Dept. Commerce, Current Fishery Statistics No. 6129, and Food Fish, Market Review and Outlook, NOAA, FFSOA 15, July 1973.

Table I-38. U. S. canned salmon production, imports and exports, 1963-1972.

Year	U.S. Production		Imports [2]	Exports [3]
	Std. Cases [1]	Quantity		
	- Thousands -	------------ Thousand pounds	----------	
1963	3,295	158,153	1,250	10,228
1964	3,759	180,442	236	20,924
1965	3,634	174,414	101	24,892
1966	4,358	209,161	589	20,484
1967	2,072	99,473	121	20,543
1968	3,448	165,490	4,956	5,726
1969	2,551	122,444	2,217	15,536
1970	3,822	183,466	2,441	16,811
1971	3,509	168,452	1,551	18,232
1972	1,773	85,109	11,647	21,358

[1] Various size cans converted to equivalent of 48, one-pound cans per case.

[2] Includes canned salmon in oil and not in oil.

[3] Product weight.

Source: Salmon, Basic Economic Indicators, NMFS, U. S. Dept. Commerce, Current Fishery Statistics No. 6129.

Table I-39. Pacific bottom fish, landing and values by states, 1963-1967[1]

Year	Alaska		Washington		Oregon		California	
	Landing (000 lbs.)	Value (000 $)	Landing (000 lbs.)	Value (000 $)	Landing (000 lbs.)	Value (000 $)	Landing (000 lbs.)	Value (000 $)
1963	1,451	132	49,026	3,086	30,884	1,618	36,199	2,660
1964	2,679	295	40,935	2,576	31,716	1,601	32,064	2,454
1965	2,758	258	50,074	2,942	32,431	1,605	35,341	2,696
1966	2,356	278	54,255	3,168	26,575	1,515	36,177	2,975
1967	2,338	220	49,150	2,916	22,261	1,328	34,847	2,933

---

[1] Source: Pacific Groundfish, Basic Economic Indicators Division of Economic Research

Table I-40. Pacific bottom fish, U. S. landings by species 1963-1973[1]

Year	Rockfish		Cod		Lingcod		Pollock		Sablefish		Flounder		Ocean Perch	
	(000 lbs)	(000 $)[2]	(000 lbs)	(000 $)[2]	(000 lbs)	(000 $)[2]	(000 lbs)	(000 $)[2]	(000 lbs)	(000 $)[2]	(000 lbs)	(000 $)[2]	(000 lbs)	(000 $)[2]
1963	25,030	1,328	6,369	350	4,790	293	N.A.	N.A.	6,464	654	51,200	3,696	23,578	1,172
1964	19,315	1,003	6,414	351	5,229	294	N.A.	N.A.	8,068	877	47,395	3,402	20,973	999
1965	21,389	1,158	10,153	525	6,818	378	146	2	7,283	716	46,463	3,410	28,352	1,334
1966	25,529	1,412	9,983	518	7,959	450	267	4	6,931	669	46,830	3,778	21,864	1,105
1967	22,139	1,328	9,155	482	8,548	484	96	2	7,073	641	46,159	3,620	15,426	861
1970	27,593	1,830	2,782	180	--	--	9,217	697	--	--	45,948	4,100	15,265	963
1971	24,674	1,524	6,472	455	--	--	10,847	828	--	--	44,285	3,935	10,843	704
1972	30,539	1,912	10,390	779	--	--	12,796	1,139	--	--	52,285	5,363	9,752	591
1973 [3]	35,419	3,451	9,482	697	--	--	14,077	1,438	--	--	47,854	4,778	5,155	506

---

[1] Pacific groundfish, basic economic indicators, Division of Economic Research

[2] Ex vessel value.

[3] Fisheries of the U.S., 1973.

Table I- 41. Atlantic bottom fish, landings and value, 1963-1972 1/

Year	Landings	Value
	Thousand Pounds	Thousand dollars
1963	518, 187	34, 308
1964	507, 984	32, 419
1965	487, 425	36, 610
1966	480, 709	40, 764
1967	403, 761	32, 855
1968	383, 100	32, 294
1969		
1970	319, 385	38, 528
1971	300, 262	36, 815
1972	284, 438	43, 288
1973	296, 463	48, 849

1/ Source: Atlantic bottom fish, Basic Economic Indicators, Division of Economic Research

2/ Includes cod, cusk, flounder, haddock, red and white hake, ocean perch, pollock and whiting.

Table I-42. Atlantic bottom fish, landings and value, by species, 1963-1972[1]

Year	Cod		Cusk		Hake (red & white)		Ocean Perch		Pollock		Whiting		Flounder		Haddock	
	Landing	Value	Landing	Value	Landing	Value	Landing	Value	Landing	Value	Landing	Value	Landing	Value	Landing	Value
	(000 lbs)	(000 $)	(000 lbs)	(000 $)	(000 lbs)	(000 $)	(000 lbs)	(000 $)	(000 lbs)	(000 $)	(000 lbs)	(000 $)	(000 lbs)	(000 $)	(000 lbs)	(000 $)
1963	42,177	3,106	1,909	110	12,961	356	131,870	6,319	14,607	670	92,643	2,178	121,627	11,036	123,972	11,705
1964	38,746	2,669	2,319	118	11,303	384	110,141	4,780	13,287	658	94,233	2,067	125,330	10,897	133,498	11,845
1965	36,048	2,877	2,177	131	10,052	365	111,960	4,728	11,856	723	82,574	2,204	127,364	13,288	133,892	13,630
1966	37,576	3,196	2,218	133	5,961	280	103,416	4,530	9,018	511	90,408	3,955	121,955	15,325	132,288	13,943
1967	44,400	3,578	1,717	106	2,800	103	71,409	2,799	7,297	410	69,543	2,156	106,508	12,495	98,464	11,094
1968	48,600	3,500	1,500	94	3,000	100	61,500	2,400	6,400	300	77,900	2,700	112,900	13,900	71,300	9,300
1969																
1970	53,226	5,740	1,351	101	6,300	358	55,290	2,725	9,217	697	44,515	3,890	122,598[2]	18,973[2]	26,888[2]	6,044[2]
1971	52,824	6,345	1,776	157	7,898	456	59,852	3,047	10,847	828	33,201	2,106	112,265	18,256	21,599	5,620
1972	46,254	7,887	2,170	215	9,513	686	58,791	3,289	12,796	1,139	26,711	2,382	116,482	23,399	11,721	4,291
1973	50,080	8,989	2,866	331	10,046	915	53,683	4,132	14,077	1,438	42,671	3,394	114,727	26,490	8,313	3,160

---

[1] Source: Atlantic Bottom Fish, Basic Economic Indicators, Division of Economic Research.

[2] Derived by subtracting Pacific landings from total landings for 1970 to 1973, Fisheries of U. S., Landings by Specie.

Table I-43. Atlantic bottom fish, U.S. sources and disposition, 1960-1972[1/] [2/]

Year	Beginning stocks	Landings	Imports	Total supply	Ending stocks	Exports	Apparent total consumption
	----------	----------	----------	million pounds	----------	----------	----------
1960	251.3	528.5	575.3	1,355.1	229.7	1.7	1,123.7
1961	229.7	532.8	709.1	1,471.6	201.5	1.4	1,268.7
1962	201.5	542.4	802.8	1,546.7	220.7	1.4	1,324.6
1963	220.7	518.2	835.0	1,573.9	234.1	1.7	1,338.1
1964	234.1	508.0	901.4	1,643.5	211.1	1.6	1,430.8
1965	211.1	487.4	1,082.4	1,780.9	250.2	2.0	1,528.7
1966	250.2	480.7	1,173.3	1,904.2	305.8	2.8	1,595.6
1967	305.8	403.8	1,063.6	1,773.2	271.0	3.1	1,499.1
1968	271.0	383.1	1,446.9	2,101.0	307.1	2.0	1,791.9
1969	307.1				306.9		
1970							
1971							
1972							

[1/] Source: Atlantic Bottom Fish, Basic Economic Indicators, Division of Economic Research.

[2/] Includes cod, cusk, flounder, haddock, red and white hake, ocean perch, pollock and whiting.

Table I-44. Supply of bottom fish fillets and steaks, 1960-1973[1]

Year	U. S. Production		Imports		Total
	Thousand pounds	Precent	Thousand pounds	Percent	Thousand pounds
1960	93,818	37.6	155,550	62.4	249,368
1961	93,039	32.3	195,099	67.7	288.138
1962	93,625	29.7	221,420	70.3	315,045
1963	83,419	26.5	231,768	73.5	315,187
1964	75,166	23.4	246,569	76.6	321,735
1965	77,180	20.7	294,954	79.3	372,134
1966	75,418	19.3	315,097	80.7	390,515
1967	71,034	20.0	283,567	80.0	354,601
1968	55,349	12.4	390,236	87.6	445,585
1969	47,269	10.0	426,728	90.0	473,997
1970	42,894	8.6	458,762	91.4	501,656
1971	43,808	8.3	482,618	91.7	526,426
1972	35,683	5.9	568,714	94.1	604,397
1973	46,685	7.5	578,826	92.5	625,511

---

[1] Includes Atlantic ocean perch and includes blocks and slabs.

Source: Fisheries of the U. S., 1972.

Table I- 45. Sea Herring - landings and processed product, Maine, 1963-1973

Year	Canned Pack		Landings	
	Sardines Mils. cases	Value Mils. $	Quantity Mils. lbs.	Value Mils. $
1963	1.62[1]			
1964	.866	7.584	60.866	1.275
1965	1.27	10.868	70.180	1.168
1966	1.33	12.262	58.299	1.209
1967	1.25	13.862	64.600	1.538
1968	1.73	19.297	69.703	1.669
1969	1.04	11.512	54.214	.968
1970	.807	11.227	36.593	.653
1971	.951	10.856		
1972	1.56	23.884		
1973	.955			

[1] Processed fishery products 1970-1972, Source: Fishery Statistics of the U.S., 1967-1969.

[2] Source: Fisheries of the U.S., 1973

Table I-46. Canned sardines, U. S. supply, 1960-1973 1/

Year	U. S. Production		Imports		Exports 2/		Total for U.S. Cons.
	Maine	Pacific	In Oil	Not in Oil	In Oil	Not in Oil	
	Thousand pounds						
1960	46,744	27,714	21,236	6,140	264	20,955	80,615
1961	17,635	18,859	27,877	14,611	185	7,475	71,322
1962	50,248	6,168	32,603	20,342	578	7,188	101,595
1963	37,890	2,568	19,908	21,640	146	3,493	78,367
1964	20,259	5,438	20,033	24,602	839	2,426	67,067
1965	29,646	374	21,532	23,538	3/	3,376	71,714
1966	31,118	116	23,601	33,987	3/	3,557	85,265
1967	29,260	4/	25,494	26,945	3/	1,373	80,326
1968	40,489	4/	28,436	30,431	3/	3,033	96,323
1969	24,401	-	27,220	18,147	3/	2,095	67,673
1970	18,872	-	34,070	12,838	3/	1,456	64,324
1971	22,249	-	31,034	18,985	3/	890	71,378

continued.....

Table I-46. Canned sardines, U. S. supply, 1960-1973 1/ (continued)

Year	U. S. Production .		Imports		Exports 2/		Total for U.S. Cons.
	Maine	Pacific	In Oil	Not in Oil	In Oil	Not in Oil	
	-------------------------------Thousand pounds --						
1972	36,540	-	41,544	28,671	3/	3,030	103,748
5/ 1973	23,284	-	36,089	31,330	3/	1,740	88,963

1/ Source: Fisheries of the U.S., 1972; U.S. Dept. of Commerce, National Oceanic and Atmospheric Administration, National Maine Fisheries Service, Current Fishery Statistics 20. 6100.

2/ It has been pointed out by the Maine Sardine Council that most of the exports presented above are actually shipments to Canada for warehousing which are then reshipped to the domestic markets.

3/ Data on the pack in oil have been included with the pack not in oil.

4/ Data not available.

5/ Fisheries of the U. S., 1973.

II. FINANCIAL RETURNS AND FINANCIAL CHARACTERISTICS OF THE INDUSTRY

The economic impact on the seafood processing industry of added pollution control costs results, in part, from the ability of the industry's segments and individual plants to absorb or to pass through the consequent additional investment costs. The present chapter considers the major qualitative and quantitative data concerning industry profitability that will influence a plant's capacity to acquire additional investment capital or to absorb investment costs.

Additionally, the chapter briefly describes the model plant configurations that were used in the impact analysis' return-on-sales framework. The models' financial characteristics are more detailed in the tables concluding the chapter.

The analysis in the chapter were complicated by several considerations.

1. Basic investment and operating costs for the seafood industry in general are unpublished and unavailable.
2. Similar data on a plant or firm basis are also unavailable.
3. Specific specie investment and operating data cannot always be isolated when plants operate as multi-specie processors, a usual industry pattern.
4. Frequently, major processors are divisions of larger corporate entities whose aggregate published data do not identify individual plant or firm financial information.
5. The industry segments generally are composed of so great a diversity of plant types that data on plant age, construction, levels of technology, investments and operating costs make standardization measures realistically difficult.

(Little meaningful research on seafood processing costs has been conducted by universities or other research organizations. In its evaluation of the market research and service programs of the National Marine Fisheries Service (October, 1972), Development Planning and Research Associates, Inc., recommended that research priority be given to studying the costs of processing seafoods and the economies of scale in the industry.) 1/

1/ Seltzer, R. E., Evaluation of Market Research and Service Activities of the National Marine Fisheries Service, Development Planning and Research Associates, 1972.

Faced with such data restrictions, this study estimated the investment and operating costs necessary to its return-on-sales analysis on the basis of a variety of unpublished sources and a great number of personal contacts with seafood processing firms. The model plants presented in this chapter, therefore, represent the general financial characteristics of broad processing segments expressed as general financial considerations and estimated profitability ranges rather than as detailed cost or expense breakdowns.

The following sections of this chapter, then, will present (1) general economic considerations concerning the industry, (2) the industry constraints affecting its ability to finance additional capital assets, and (3) the industry's model plant configurations and applicable profitability levels.

A. General Considerations

As emphasized, many conditions intrinsic to the seafood processing industry partly determine the economic impacts of impending effluent limitation standards. Some are directly related to the industry's physical or location characteristics and their importance in such that they must be repeated and further emphasized.

1. Physical Considerations

Except for various portions of the salmon, clam, and fish meal segments, the seafood processing segments included in this study are made up, in large part, of many small plants. For many of the segments, relatively low capital requirements have allowed unrestricted entry and have resulted in a highly competitive and fragmented industry.

These economically and physically small plants are, in general, relatively old facilities that are operated by second and third generation families. Though plant age, however, is a nebulous concept, since modernization and plant replacement is an on-going process, the mere fact that many plants are located on sites established years ago has several implications.

Frequently the land surrounding the sites has since been developed for industrial, residential, or commercial activities and has made the seafood processing plant an enclosed and virtual enclave. Land required for expansion or waste water treatment facilities is now frequently available only at exorbitant prices. Too, the land, when available, is often unsatisfactory: its zoning regulations are prohibitory or it is not geographically suitable for plant expansion or waste water treatment facilities. Additional constraints stemming from tribal land ownership by native Americans (Indian or Eskimo), principally in Alaska, are also encountered.

2. Economic Considerations

Such physical conditions often result in the general under-utilization of plant capacity, the lack of raw product, difficulties acquiring required capital, and a declining number of plants. For most of the seafood industry the above description is the general rule rather than the exception.

B. Constraints on Financing Additional Capital Assets

Constraints on financing additional capital required for water pollution control facilities will vary greatly from firm-to-firm and from location-to-location. In general, most large seafood processing plants will not face serious constraints in securing the additional investment capital required for pollution controls. However, where plants are old, obsolete or unprofitable, and where local conditions may require substantial investments for internal pollution abatement systems or for participating in expanding the capacity of community sewer systems, plant management may be unwilling to make the investments required. The difficulties encountered depend on the amount of capital required and the constraints encountered.

Plants owned by conglomerates, large diversified food processing firms or large diversified seafoods processing companies will have less difficulty in acquiring capital. In situations where uncertainty exists concerning the continued supply of resource stock even the large processors may hesitate to seek the funds required for pollution abatement equipment.

Capital availability may be a greater problem for small plants which continue to operate primarily because owners have depreciated out original investment costs, consider their investment in the plant as "sunk capital" or consider that the plant has a "utility value" if continued in operation which is greater than the "market value" or "salvage value" of the plant should they decide to cease operations. For such plants the increased investment required for pollution control may be difficult to obtain. In such situations, attempt to obtain additional capital may be based on the owners' desire to maintain the business for personal employment reasons rather than on the expectation of a return on invested capital.

C. Estimated Earnings and Financial Considerations by Segment

Prior to this point most of the discussion has been in reference to general characteristics and statistics concerning plant numbers, landing, demand and supply by industry segment. It is now time to focus attention on specific financial considerations by industry segment. This is accomplished by developing model plants which are used to represent financial profiles of various types of plants.

It must be emphasized that the model plants described below portray the financial characteristics of groups of plants rather than the exact characteristics of specific plants; therefore, any one actual plant in the industry will have profitability measures that differ from the estimates provided. Unique location, production or process characteristics insure this. The economic contractor recognized that variations occur and utilized broad profitability measures and sensitivity analyses in this study's impact analysis to compensate for such variations.

The model plants do not estimate specific line items such as labor, cans, and fuel. All plant models were, however, constructed with as much detail as possible and such details were then aggregated into broader items such as product-related or plant-related expenses. Investment data is even more difficult to gather and to analyze than are direct or indirect expenses, for numerous variations and complications exist due to plant age and processing characteristics.

The model plant data resulted from visits and personal interviews, written and oral communications, and published investment, cost and price data. These data were analyzed and used for the model plant configuration presented in the Tables at the end of this chapter.

A brief review of the models is presented below.

1. Alaskan Salmon Canning Segments

Twelve Alaskan salmon canning model plants were constructed to delineate the various sizes of plants in three Alaskan regions: Southeast, Central and Western Alaska. These models were based upon specific plant data from numerous salmon processing plants in these areas. All data were from 1972 figures.

The effects of low plant utilization are obvious for the plants were operating at from 15 to 30 percent of capacity. Due to the large fixed investments and fixed costs, the Alaskan salmon canning plants all show large losses approaching 40 percent of sales for 1972. Annual cash flow is negative in all cases, including the large plants. Tables II-1 to II-3 present the model plant data for these plants. From a purely economic view and without the knowledge of, perhaps, extenuating circumstances, it is difficult to understand the continued operation of these Alaskan salmon canning segment plants considering the extent of the losses indicated in the tables.

Because 1972 reflects the effects of extremely low utilization, model plants were also constructed for a five year period, 1968 to 1972. These show positive cash flow and profits. Profits as a percent of sales for this period range from 1 to approximately 5 percent of sales before tax. This rate of return is relatively low considering the risk and variability that may be attached to future salmon runs. Two or three consecutive years of low plant utilization can effectively reduce profits to very low levels. Tables II-4 through II-6 present the five year period data.

Even over a five year period, which should be a long enough period of times to erase seasonal variations, the profitability estimates suggest that new capital is not likely to be attracted to this segment. This is especially true considering the segments' unusually high risk and uncertainty. The high percentage of underutilized capacity coupled with substantial variations in volume of landings further discourage new capital investment.

2. West Coast Salmon Canning Segments

Two West Coast salmon canning model plants were constructed: one model with sales of approximately $600,000 and another with sales of approximately $2,500,000. Using published prices of $50.50 per case, these sales represent 12,500 and 50,000 cases annually.

Both plants at 50 percent of capacity, and even at this relatively low rate, both have a positive cash flow for 1972.

Before-tax return on sales for the two models is 6.1 and 9.9 percent respectively. These rates of return are expected to be higher than the average because of high foreign demand for salmon in 1972. Cash flow and earnings data for these models are shown in Table II-7.

3. West Coast and Alaska Fresh and Frozen Salmon Segment

A total of five West Coast and Alaskan fresh and frozen salmon models were constructed, ranging in size from 20,000 pounds to 1,350,000 pounds.

In general the plants have a positive cash flow and a profitability rate of 4.5 to 8.8 percent tax return on sales. Little investment is required for a plant of this type. The small plant has total assets of $17,000, much of which is current (inventory). Return on investment is estimated to be between 6.5 and 14.5 percent.

Investment, profitability and operating data are shown in Tables II-8 to II-10. A halibut processing line is also presented for two of these plants.

4. West Coast Bottom Fish Segment

Table II-11 presents data for bottom fish processors. The models in this segment show low levels of profitability with the small bottom fish plant showing a loss. Before tax return on sales for the bottom fish processors varies from -11.2 percent to plus 2.8 percent.

The above plants and profitability measures are used for West Coast and Alaskan bottom fish processors.

5. Atlantic Bottom Fish Segment

At 75 percent capacity, the Atlantic bottom fish processing models show a before-tax return on sales of 2.3 to 5.3 percent. Return on investment ratios are estimated to be 3.2, 3.7 and 5.8 percent for the three plants. (Table II-12).

The basic relationships for these models were developed from plant interviews, actual plant data, and fundamental relationships derived in other segments.

6. Fish Meal Segment

Two models were developed for the fish meal segment. The model presented in Table II-13 was developed for the anchovy reduction segment and the model presented in Table II-14 was developed for small menhaden producers. One small model plant only is presented for the menhaden segment (this is not viewed as a serious limitation since the EPA control guidelines require only in-plant changes for large menhaden plants). Both segments have a positive cash flow and profit ratios. Before-tax return on sales is 3 and 6 percent for menhaden and anchovy reduction plants respectively.

7. Oyster Segments

Three oyster plant models are shown in Table II-15 through II-17: one for Eastern fresh and frozen oysters, one for oyster canners, and one for West Coast fresh and frozen oysters. All show positive cash flows and returns ranging from 2.9 percent to 5 percent before-tax return on sales.

Return on investment measures are estimated to be 4.6, 8.7, and 8.5 percent for the three plants.

8. Clam Segments

Estimated earnings and cash flow for two clam models are presented in Table II-18 and II-19. Before-tax return on sales is estimated at 4.4

and 4.9 percent for the canned clam and fresh and frozen clam models respectively.

9. Maine Sardine Segment

Two models were developed for the Maine sardine segment and shown in Table II-20. These are for plants with approximately 40,000 and 130,000 case productions in 1972.

The returns are estimated at 5.4 and 3.7 for the small and large plants respectively, and the small plant's greater margin is due to the plants higher rate of utilization. Since plant utilization is somewhat higher in 1972 than in preceeding or subsequent years, these profitability rates and financial returns are higher than should be expected over the long run.

Individual models for the sea herring filleting segment were not included.

D. Summary

The model plants presented in this chapter utilized all data available to the economic contractor. A great number of personal contacts and published data, when available, were used to develop these models. Even though every attempt was made to be comprehensive, there are cases where data were not available or were deliberately withheld. In these situations basic relationships were extrapolated from other segments.

The profitability measures as presented in the model plants were used in the impact analysis, Chapter IV. As has been stated earlier, modifications were made and a sensitivity analysis utilized.

Some of the data developed and presented in the model plants are further summarized in Tables II-21 and II-22. Table II-21 presents a summary of financial returns by segment, and Table II-22 presents selected margins by processing segment.

In general, several conclusions can be made from the models analyzed.

1. Alaskan seafood plants in 1972 appeared to be generally unprofitable. They were marginally profitable as an average of the 1968-72 period.
2. Larger plants are generally more profitable than smaller plants.
3. Returns on investment to most segments are below current interest rates.

Table II-1. Estimated earnings and cash flow for Southeast Alaska salmon canner, 1972

	Plant size $1,468,000 Annual sales [1]	Plant size $2,431,000 Annual sales [1]	Plant size $2,889,000 Annual sales [1]
Annual capacity (cases)	105,000	175,000	210,000
1972 Utilization	30%	30%	30%
1972 Production (cases) [2]	32,000	53,000	63,000
Sales	1,468 [3]	2,431 [3]	2,889 [3]
Product related expenses	1,122	1,928	2,335
Plant related expenses	436	750	908
Cash earnings	(91)	(247)	(354)
Depreciation	72	102	114
Interest	36	51	57
Pretax income	(199)	(400)	(525)
Income tax	--	--	--
After tax income	--	--	--
Annual cash flow	(127)	(298)	(411)
Estimated replacement investment	3,000	4,250	4,750
Book value investment	1,200	1,700	1,900
Current assets	485	812	953
Net working capital	191	326	375
Total assets	1,685	2,512	2,853
Estimated long-term debt	556	810	910
ROS (% before tax)	(13.6)	(16.4)	(18.1)
ROI (% profit before tax/ total assets)	(11.8)	(15.9)	(18.4)

---

[1] All revenue, expense and financial data shown in thousands.

[2] Standard cases defined as 48/1 lbs.

[3] Ave. price $45.86 per case as reported by selected Southeast Alaska salmon canners.

Table II-2. Estimated earnings and cash flow for Central Alaskan salmon canner, 1972

	Plant size $1,079,000 Annual sales [1]	Plant size $2,159,000 Annual sales [1]	Plant size $3,285,000 Annual sales [1]
Annual capacity (cases)	116,000	232,000	348,000
1972 Utilization	20%	20%	20%
1972 Production (cases) [2]	23,000	46,000	70,000
Sales	1,079 [3]	2,159 [3]	3,285 [3]
Product related expenses	865	1,740	2,731
Plant related expenses	336	677	1,062
Cash earnings	(122)	(258)	(508)
Depreciation	36	79	108
Interest	18	40	54
Pretax income	(176)	(377)	(670)
Income tax	--	--	--
After tax income	--	--	--
Annual cash flow	(140)	(298)	(562)
Estimated replacement investment	1,500	3,300	4,500
Book value investment	600	1,320	1,800
Current assets	356	712	1,084
Net working capital	140	280	427
Total assets	956	2,032	2,884
Estimated long-term debt	296	640	891
ROS (% before tax)	(16.3)	(17.5)	(20.4)
ROI (% profit before tax/ total assets)	(18.4)	(18.6)	(23.2)

---

[1] All expense, sales and financial data shown in thousands.

[2] Standard cases defined as 48/1 lbs.

[3] Ave. price $46.93 per case as reported by selected Central Alaska salmon canners.

Table II -3. Estimated earnings and cash flow for Western Alaska salmon canner, 1972

	Plant size $489,000 Annual sales [1]	Plant size $978,000 Annual sales [1]	Plant size $1,956,000 Annual sales [1]
Annual capacity based on 34 days, at 8 hrs/day	68,000 cases	136,000 cases	272,000 cases
1972 Utilization	15%	15%	15%
1972 Production (cases) [2]	10,000	20,000	40,000
Sales	489 [3]	978 [3]	1,956 [3]
Product related expenses	487	998	1,966
Plant related expenses	146	298	589
Cash earnings	(144)	(318)	(599)
Depreciation	32	43	112
Interest	16	22	56
Pretax income	(192)	(383)	(767)
Income tax	--	--	--
After tax income	--	--	--
Annual cash flow	(160)	(340)	(655)
Estimated replacement investment	1,800	2,400	6,200
Book value investment	540	720	1,860
Current assets	194	387	775
Net working capital	77	152	305
Total assets	734	1,107	2,635
Estimated long-term debt	247	349	866
ROS (% before tax)	(39.3)	(34.8)	(33.5)
ROI (% profit before tax/ total assets)	(26.2)	(34.6)	(29.1)

---

[1] All expense, sales and financial data shown in thousands.

[2] Standard cases defined as 48/1 lbs.

[3] Ave. price $48.90 per case as reported by selected Western salmon canners.

Table II-4. Estimated earnings and cash flow for Southeast Alaska salmon canners, (5-year average 1968-1972)

	Plant size $2,250,000 Annual sales	Plant size $2,400,000 Annual sales	Plant size $2,500,000 Annual sales
Annual capacity (based on 50 day, 7 hr/day)	105,000 annual cases [1]	175,000 annual cases	210,000 annual cases
Sales	2,250 [2]	2,400 [2]	2,500 [2]
Product related expenses Plant related expenses	2,042	2,122	2,189
Cash earnings	208	278	311
Depreciation	72	102	114
Interest	36	51	57
Pretax income	100	125	140
Income tax	48	60	67
After tax income	52	65	73
Annual cash flow	124	167	187
Replacement investment	3,000	4,250	4,750
Book value of investment	1,200	1,700	1,900
Current assets	743	792	825
Net working capital	293	312	325
Total assets	1,943	2,492	2,725
ROS (% before tax)	4.4	5.2	5.6
ROI(% profit before tax/ total asset)	5.1	5.0	5.1

[1] Standard cases are assumed to be 48/1 lbs.

[2] All expense, sales and financial data shown in thousands.

Table II-5. Estimated earnings and cash flow for Central Alaska salmon canners, (5-year average 1968-1972)

	Plant size $1,000,000 Annual sales	Plant size $2,300,000 Annual sales	Plant size $4,000,000 Annual sales
Annual capacity (based on 50 day, 7 hr/day)	116,000 annual cases[1]	232,000 annual cases	348,000 annual cases
Sales	1,000[2]	2,300[2]	4,000[2]
Product related expenses	898	2,071	3,678
Plant related expenses			
Cash earnings	102	229	322
Depreciation	36	79	108
Interest	18	40	54
Pretax income	48	110	160
Income tax	23	53	77
After tax income	25	57	83
Annual cash flow	61	136	191
Replacement investment	1,500	3,300	4,500
Book value of investment	600	1,320	1,800
Current assets	330	759	1,320
Net working capital	130	299	520
Total assets	930	2,079	3,120
ROS (% before tax)	4.8	4.8	4.0
ROI(% profit before tax total asset)	5.2	5.3	5.1

---

[1] Standard cases are assumed to be 48/1 lbs.

[2] All expense, sales and financial data shown in thousands.

Table II-6 . Estimated earnings and cash flow for Western Alaska salmon canners (5-year average 1968-1972)

	Plant size $1,358,000 Annual sales	Plant size $2,675,000 Annual sales	Plant size $3,319,000 Annual sales
Annual capacity (based on 34 day, at 8 hr/day)	68,000 cases 1/	136,000 cases 1/	272,000 cases 1/
Sales	1,358 2/	2,675 2/	3,319 2/
Product related expenses	1,292	2,475	2,976
Plant related expenses			
Cash earnings	66	200	343
Depreciation	32	43	112
Interest	16	22	56
Pretax income	18	135	175
Income tax	9	65	84
After tax income	9	70	91
Annual cash flow	41	113	203
Replacement investment	1,800	2,400	6,200
Book value investment	540	720	1,860
Current assets	448	883	1,095
Net working capital	176	348	431
Total assets	988	1,603	2,955
Current Liabilities	272	535	664
Long term debt	286	427	916
ROS (% before tax)	1.3	5.0	5.3
ROI (% profit before tax/ total assets)	1.8	8.4	5.9

1/ Standard cases are assumed to be 48/1 lbs.

2/ All expense, revenue and financial data shown in thousands.

Table II-7. Estimated earnings and cash flow for West Coast salmon canner, 1972

	Plant size $630,000 Annual sales	Plant size $2,500,000 Annual sales
Annual capacity (cases)	25,000	100,000
1972 Utilization	50%	50%
1972 Production (cases) [1]	12,500	50,000
Sales	631,250 [2]	2,525,000 [2]
Product related expenses	482,500	1,810,000
Plant related expenses	85,000	365,000
Cash earnings	63,750	350,000
Depreciation	7,500	30,000
Interest	17,500	70,000
Pretax income	38,750	250,000
Income tax	12,250	113,600
After tax income	26,500	136,400
Annual cash flow	34,000	166,400
Estimated replacement investment	170,000	1,600,000
Book value investment	80,000	530,000
Current assets	310,000	1,230,000
Net working capital	145,000	570,000
Total assets	390,000	1,760,000
Estimated long-term debt	38,000	250,000
ROS (% before tax)	6.1	9.9
ROI (% profit before tax/ total assets)	9.9	14.2

---

[1] Ave. price $50.50 per case reported by Canned Fishery Products, 1972. Annual Summary (Preliminary) National Marine Fisheries Service, April 10, 1973 pg. 5.

Table II-8. Estimated earnings and cash flow for West Coast and Alaskan fresh and frozen salmon processor, 1972

	Plant size $25,000 Annual sales	Plant size $370,000 Annual sales	Plant size $1,000,000 Annual sales
Annual capacity	40,000	600,000	1,500,000
1972 Utilization	50%	50%	50%
1972 Production (pounds)	20,000	300,000	800,000
Sales	24,600	369,000[1]	984,000[1]
Product related expenses	20,000	297,000	792,000
Plant related expenses	2,500	30,000	65,000
Cash earnings	2,100	42,000	127,000
Depreciation	600	8,900	24,000
Interest	400	6,000	16,000
Pretax income	1,100	27,100	87,000
Income tax	250	6,600	35,400
After tax income	850	20,500	51,600
Annual cash flow	1,450	29,400	75,600
Estimated replacement investment	15,000	210,000	360,000
Book value investment	5,000	70,000	120,000
Current assets	12,000	180,000	480,000
Net working capital	5,500	83,000	230,000
Total assets	17,000	250,000	600,000
Estimated long-term debt	2,400	35,000	58,000
ROS (% before tax)	4.5	7.3	8.8
ROI (% profit before tax/ total assets)	6.5	10.8	14.5

---

[1] Ave. price $1.23 per lb. reported by Food Fish Market Review and Outlook, National Marine Fisheries Service July, 1973, p. 51. Wholesale price, ave. of King and Silver dressed salmon, 1972.

Table II-9. Estimated earnings and cash flow for West Coast and Alaskan fresh and frozen salmon processor, 1972

	Halibut $390,000 Annual sales		Salmon $1,657,500 Annual sales
Annual capacity	620,000		2,700,000
1972 Utilization	60%		50%
1972 Production (pounds)	371,400		1,347,600
Sales	390,000 1/		1,657,500 2/
Product related expenses	393,600		1,335,000
Plant related expenses	3,200		108,000
Cash earnings	(6,800)		214,500
Depreciation	2,200		27,000
Interest	1,700		26,900
Pretax income	(10,700)		160,600
Income tax	(0)		70,700
After tax income	(10,700)		89,900
Annual cash flow	(8,500)		116,900
Estimated replacement investment		950,000	
Book value investment		473,000	
Current assets		998,000	
Net working capital		461,000	
Total assets		1,471,000	
Estimated long-term debt		227,000	
ROS (% before tax)		7.3	
ROI (% profit before tax/ total assets)		10.2	

1/ Ave. price $1.05 per lb. as reported by selected West Coast processors.

2/ Ave. price $1.23 per lb. reported by Food Fish Market Review and Outlook, National Marine Fisheries Service, July 1973, pg. 51. Ave. wholesale price of King and Silver dressed salmon, 197

Table II-10. Estimated earnings and cash flow for West Coast and Alaskan fresh and frozen salmon processor, 1972

	Halibut $5,000 Annual sales	Salmon $389,000 Annual sales
Annual capacity	8,000	630,000
1972 Utilization	60%	50%
1972 Production (pounds)	4,800	316,000
Sales	5,000 1/	389,000 2/
Product related expenses	5,110	313,000
Plant related expenses	700	32,000
Cash earnings	(810)	44,000
Depreciation	204	9,000
Interest	86	6,000
Pretax income	(1,100)	29,000
Income tax	(0)	7,500
After tax income	(1,100)	21,500
Annual cash flow	(896)	30,500

Estimated replacement investment	320,000
Book value investment	159,000
Current assets	192,000
Net working capital	89,000
Total assets	351,000
Estimated long-term debt	92,000
ROS (% before tax)	7.1
ROI (% profit before tax/ total assets)	7.9

1/ Ave. price $1.05 per lb. as reported by selected West Coast processors.

2/ Ave. price $1.23 per lb. reported by Food Fish Market Review and Outlook, National Marine Fisheries Service, July 1973, pg. 51, Ave. wholesale price of King and Silver dressed salmon, 1972

Table II -11. Estimated earnings and cash flow for West Coast and Alaskan bottom fish processor, 1972

	Plant size $80,000 Annual sales	Plant size $300,000 Annual sales	Plant size $640,000 Annual sales
Annual capacity	115,000	430,000	915,000
1972 Utilization	80%	80%	80%
1972 Production (pounds)	92,000	344,800	732,000
Sales	80,000 [1]	300,000 [1]	637,000 [1]
Product related expenses	70,800	255,100	534,300
Plant related expenses	14,000	30,000	66,500
Cash earnings	(4,800)	14,900	36,200
Depreciation	2,900	4,700	13,000
Interest	1,500	2,500	5,500
Pretax income	(9,200)	7,700	17,700
Income tax	-0-	1,700	4,000
After tax income	(9,200)	6,000	13,700
Annual cash flow	(6,300)	10,700	26,700
Estimated replacement investment	175,000	300,000	675,000
Book value investment	61,000	103,000	228,900
Current assets	39,000	146,000	310,000
Net working capital	18,000	67,000	143,000
Total assets	100,000	249,000	538,900
Estimated long-term debt	29,000	49,000	110,000
ROS (% before tax)	(11.5)	2.6	2.8
ROI (% profit before tax/ total assets)	(11.6)	3.1	3.3

---

[1] Average price of $.87 per pound as reported by West Coast and Alaskan bottom fish processors.

Table II-12. Estimated earnings and cash flow for Atlantic bottom fish processor, 1972

	Plant size $100,000 Annual sales	Plant size $215,000 Annual sales	Plant size $1,720,000 Annual sales
Annual capacity	160,000	325,000	2,600,000
1972 Utilization	75%	75%	75%
1972 Production (pounds)	120,000	250,000	2,000,000
Sales	103,000[1]	214,700[1]	1,720,000[1]
Product related expenses	84,000	175,450	1,398,000
Plant related expenses	15,000	30,000	200,000
Cash earnings	4,000	9,250	122,000
Depreciation	600	1,250	10,000
Interest	1,000	2,500	20,000
Pretax income	2,400	5,500	92,000
Income tax	500	1,200	38,000
After tax income	1,900	4,300	54,000
Annual cash flow	2,500	5,550	64,000
Estimated replacement investment	75,000	125,000	2,250,000
Book value investment	25,000	45,000	750,000
Current assets	50,000	105,000	840,000
Net working capital	23,000	49,000	390,000
Total assets	75,000	150,000	1,590,000
Estimated long-term debt	12,000	22,000	360,000
ROS (% before tax)	2.3	2.6	5.3
ROI (% profit before tax/ total assets)	3.2	3.7	5.8

---

[1] Ave. price $.86 per lb. as reported by selected by Atlantic bottom fish processors, 1972.

Table II - 13. Estimated earnings and cash flow for anchovy processor, 1972

	Plant size $405,000 Annual sales
Annual capacity	--
1972 Utilization	--
1972 Production (pounds)	5,800,000
Sales	405,000 [1]
Product related expenses	321,000
Plant related expenses	20,000
Cash earnings	64,000
Depreciation	25,000
Interest	15,000
Pretax income	24,000
Income tax	5,400
After tax income	18,600
Annual cash flow	43,600
Estimated replacement investment	750,000
Book value investment	225,000
Current assets	130,000
Net working capital	60,000
Total assets	355,000
Estimated long-term debt	110,000
ROS (% before tax)	6.0
ROI (% profit before tax/ total assets)	8.8

---

[1] Ave. price for dried scrap and meal, solubles and oil $.07 per lb as reported by selected anchovy processors.

Table II - 14. Estimated earnings and cash flow for Menhaden processor, 1972[1]

	Plant Size $1,200,000 Annual sales
Annual capacity	--
1972 Utilization	--
1972 Production (pounds)	13,000,000
Sales	1,200,000[2]
Product related expenses	964,000
Plant related expenses	95,000
Cash earnings	141,000
Depreciation	53,000
Interest	53,000
Pretax income	35,000
Income tax	10,000
After tax income	25,000
Annual cash flow	78,000
Estimated replacement investment	1,200,000
Book value investment	470,000
Current assets	390,000
Net working capital	180,000
Total assets	860,000
Estimated long-term debt	225,000
ROS (% before tax)	3.0
ROI (% profit before tax/ total assets)	4.1

---

[1] Although there are substantial numbers of small fish meal plants, these are primarily fish scrap processors, not Menhaden processors.

[2] Ave. price dried meal and scrap, $185.50 per ton or $.093 per lb. reported by Industrial Fishery Products Market Review and Outlook, National Marine Fisheries Service, July 1973, pg. 19.

Table II -15. Estimated earnings and cash flow for Eastern fresh and frozen oyster processor, 1972

	Plant size $60,000 Annual sales	Plant size $240,000 Annual sales
Annual capacity	58,750	235,000
1972 Utilization	85	85%
1972 Production (pounds)	50,000	200,000
Sales	59,500[1]	238,000[1]
Product related expenses	49,500	198,000
Plant related expenses	7,500	30,000
Cash earnings	2,500	10,000
Depreciation	500	2,000
Interest	250	1,000
Pretax income	1,750	7,000
Income tax	400	1,600
After tax income	1,350	5,400
Annual cash flow	1,850	7,400
Estimated replacement investment	25,000	100,000
Book value investment	9,500	38,000
Current assets	28,000	115,000
Net working capital	13,000	53,000
Total assets	37,500	153,000
Estimated long-term debt		
ROS (% before tax)	2.9	2.9
ROI (% profit before tax/ total assets)	4.6	4.6

---

[1] Ave. price $1.19 per lb. reported by Fisheries of the United States, 1972, National Marine Fisheries Service, March, 1973, p. 66.

Table II-16. Estimated earnings and cash flow for oyster canner, 1972

	Plant size $270,000 Annual sales
Annual capacity	30,000
1972 Utilization	85%
1972 Production (cases) [1]	25,000
Sales	268,500[2]
Product related expenses	227,500
Plant related expenses	26,000
Cash earnings	15,000
Depreciation	1,000
Interest	500
Pretax income	13,500
Income tax	3,000
After tax income	10,500
Annual cash flow	11,500
Estimated replacement investment	75,000
Book value investment	25,000
Current assets	130,000
Net working capital	60,000
Total assets	155,000
Estimated long-term debt	12,000
ROS (% before tax)	5.0
ROI (% profit before tax/ total assets)	8.7

---

[1] Standard cases are defined as 24/4-2/3 oz.

[2] Ave. price $10.74 per case reported by Canned Fishery Products, 1972, National Marine Fisheries Service, April 10, 1973, pg. 3.

Table II - 17. Estimated earnings and cash flow for West Coast fresh and frozen oyster processor, 1972

	Plant size $180,000 Annual sales
Annual capacity	165,000
1972 Utilization	90%
1972 Production (pounds)	150,000
Sales	178,500[1]
Product related expenses	152,000
Plant related expenses	15,000
Cash earnings	11,500
Depreciation	1,500
Interest	1,000
Pretax income	9,000
Income tax	2,000
After tax income	7,000
Annual cash flow	8,500
Estimated replacement investment	40,000
Book value investment	19,000
Current assets	87,000
Net working capital	40,000
Total assets	106,000
Estimated long-term debt	9,000
ROS (% before tax)	5.0
ROI (% profit before tax/ total assets)	8.5

---

[1] Ave. price $1.19 per lb. as reported by selected West Coast oyster processors, 1972.

Table II -18. Estimated earnings and cash flow for clam canner, 1972

	Plant size $240,000 Annual sales
Annual capacity	---
1972 Utilization	---
1972 Production(cases)[1]	25,000
Sales [2]	240,000[2]
Product related expenses	204,000
Plant related expenses	24,000
Cash earnings	12,000
Depreciation	1,000
Interest	500
Pretax income	10,500
Income tax	2,400
After tax income	8,100
Annual cash flow	9,100
Estimated replacement investment	60,000
Book value investment	25,000
Current assets	117,000
Net working capital	54,000
Total assets	142,000
Estimated long-term debt	12,000
ROS (% before tax)	4.4
ROI (% profit before tax/ total assets)	7.4

---

[1] Standard case defined as 48/5 oz.

[2] Ave. price $9.60 per case reported by Canned Fishery Products, 1972. National Marine Fisheries Service, April 10, 1973, p. 3.

Table II - 19. Estimated earnings and cash flow for fresh and frozen clam processors, 1972.

	Plant size $75,000 Annual Sales	Plant size $255,000 Annual Sales
Annual capacity (gallons)	26,000	88,000
1972 Utilization	85%	85%
1972 Production (gallons) [1]	22,000	75,000 [2]
Sales	$75,000	$255,000
Product related expenses	63,000	215,000
Plant related expenses	7,000	24,000
Cash earnings	4,700	16,000
Depreciation	600	2,000
Interest	400	1,500
Pretax income	3,700	12,500
Income tax	900	3,000
After tax income	2,800	9,500
Annual cash flow	3,400	11,500
Estimated replacement investment	53,000	180,000
Book value investment	25,000	85,000
Current assets	36,500	124,000
Net working capital	17,000	57,000
Total assets	61,500	209,000
Estimated long-term debt	12,000	40,000
ROS (% before tax)	4.9	4.9
ROI (% profit before tax/ total assets)	6.0	6.0

---

[1] Gallons are defined as 8.75 lbs.

[2] Ave. price $3.40 per gallon as reported by selected clam processors.

Table II-20. Estimated earnings and cash flow for Maine sardine processors, 1972

	Plant size $720,000 Annual sales	Plant size $2,150,000 Annual sales
Annual capacity (cases)	43,000	150,000
1972 Utilization	100%	85%
1972 Production (cases) [1]	43,000	127,500
Sales	722,400 [2]	2,142,000 [2]
Product related expenses	511,300	1,490,000
Plant related expenses	159,100	535,000
Cash earnings	52,000	117,000
Depreciation	8,600	25,500
Interest	4,300	12,500
Pretax income	39,100	79,000
Income tax	12,400	31,500
After tax income	26,700	47,500
Annual cash flow	35,300	73,000
Estimated replacement investment	643,000	1,950,000
Book value investment	66,000	420,000
Current assets	380,000	1,125,000
Net working capital	325,000	645,000
Total assets	446,000	1,545,000
Estimated long-term debt	32,000	200,000
ROS (% before tax)	5.4	3.7
ROI (% profit before tax/ total assets)	8.8	5.1

---

[1] Standard cases defined as 100/1/4 lb.

[2] Ave. price $16.80 per case reported by Foodfish Market Review and Outlook, National Marine Fisheries Service, December 1973, p. 50.

Table II-21. Summary of financial returns by segment, 1972

	Table No.	Plant Size	Sales $	Production (lbs.)	ROS % Before tax	ROI % Before tax	Cash Flow
West Coast Fresh and Frozen Salmon	II-8	S	25,000	20,000	4.5	6.5	1,450
	II-8	M	370,000	300,000	7.3	10.8	29,400
	II-8	L	1,000,000	800,000	8.8	14.5	75,600
	II-10	M	389,000	316,000	7.1	7.9	30,500
	II-9	L	1,657,500	1,350,000	7.3	10.2	116,900
				(cases)			
West Coast Salmon Canner	II-7	M	630,000	12,500 1/	6.1	9.9	34,000
	II-7	L	2,500,000	50,000 1/	9.9	14.2	166,400
Western Alaska Salmon Canner	II-3	S	489,000	10,000 1/	(39.3)	(26.2)	(160,000)
	II-3	M	978,000	20,000 1/	(34.8)	(34.6)	(340,000)
	II-3	L	1,956,000	40,000 1/	(33.5)	(29.1)	(655,000)
Southeast Alaska Salmon Canner	II-1	M	1,468,000	32,000 1/	(13.6)	(11.8)	(127,000)
	II-1	LL	2,431,000	53,000 1/	(16.4)	(15.9)	(298,000)
	II-1	L	2,889,000	63,000 1/	(18.1)	(18.4)	(411,000)
Central Alaska Salmon Canner	II-2	M	1,079,000	23,000 1/	(16.3)	(18.4)	(140,000)
	II-2	L	2,159,000	46,000 1/	(17.5)	(18.6)	(298,000)
	II-2	L	3,285,000	70,000 1/	(20.4)	(23.2)	(562,000)
West Coast Bottom fish	II-11	S	80,000	92,000 lbs.	(11.5)	(11.6)	(6,300)
	II-11	M	300,000	344,800 lbs.	2.6	3.1	10,700
	II-11	L	640,000	732,000 lbs.	2.8	3.3	26,700

Continued........

Table II-21. Summary of financial returns by segment (continued)

Segment	Table No.	Plant Size	Sales	Production	ROS % Before tax	ROI % Before tax	Cash Flow
Atlantic Bottom fish	II-13	S	100,000	120,000 lbs.	2.3	3.2	2,500
	II-13	M	215,000	250,000 lbs.	2.6	3.7	5,550
	II-13	L	1,720,000	2,000,000 lbs.	5.3	5.8	64,000
Maine sardine	II-20	M	720,000	43,000 cases2/	5.4	8.8	35,300
	II-20	L	2,150,000	127,500 cases2/	3.7	5.1	73,000
Fish Meal, Menhaden,	II-14	S	1,200,000	13,000,000 lbs.	3.0	4.1	78,000
Anchovy	II-13	M	405,000	5,800,000 lbs.	6.0	8.8	43,600
West Coast Fresh and Frozen Oyster	II-17	M	180,000	150,000 lbs.	5.0	8.5	8,500
East Coast Fresh and Frozen Oyster	II-15	M	240,000	200,000 lbs.	2.9	4.6	7,400
Oyster Canner	II-16	M	270,000	25,000 cases3/	5.0	8.7	11,500
Fresh and Frozen clam	II-19	M	255,000	75,000 gal.4/	4.9	6.0	11,500
Clam canner	II-18	M	240,000	25,000 cases5/	4.4	7.4	9,100

1/ Standards cases defined as 48/1 lb.

2/ Standard cases defined as 100/4oz.

3/ Standard cases defined as 24/4-2/3 oz.

4/ Standard gallons defined as 8.75 lb.

5/ Standard cases defined as 48/5 oz.

Table II-22. Summary of basic financial characteristics for selected seafood processing segments.

	West Coast fresh and frozen salmon					West Coast salmon canner		Western Alaska salmon canner		
Plant Size	S	M	L	M	L	M	L	S	M	L
Net Sales	1.00	100	100	100	100	100	100	100	100	100
Cost of goods sold (including all product related expenses)	81.3	80.5	80.5	80.7	84.4	76.4	71.7	99.6	102	100.5
Gross margin	18.7	19.5	19.5	19.3	15.6	23.6	28.3	.4	(2)	(.5)
All other expenses	14.2	12.2	10.7	12.2	8.3	17.5	18.4	39.7	34.6	33.0
Net income	4.5	7.3	8.8	7.1	7.3	6.1	9.9	(39.3)	(34.8)	(33.5

	Southeastern Alaska salmon canner			Central Alaska salmon canner			West Coast bottom fish			
	M	L	L	M	L	L	S	M	L	L
Net Sales	100	100	100	100	100	100	100	100	100	100
Cost of goods sold (Product related expenses)	76.4	79.3	80.8	80.2	80.6	83.1	88.5	85.0	83.9	86.5
Gross margin	23.6	20.7	19.2	19.8	19.4	16.9	11.5	15.0	16.1	13.5
All other expenses	37.2	37.1	37.3	36.1	36.9	37.3	23.0	12.4	13.3	8.3
Net income	(13.6)	(16.4)	(18.1)	(16.3)	(17.5)	(20.4)	(11.5)	2.6	2.8	5.2

Continued.........

Table II-22. Summary of basic financial characteristics for selected seafood processing segments (continued).

	Atlantic bottom fish			Maine sardines		Fish Meal		West Coast	Eastern
						Menhaden	Anchovy	F & F	oyster
	S	M	L	M	L	S	M	M	M
Net Sales	100	100	100	100	100	100	100	100	100
Cost of goods sold (Product related expenses)	81.6	81.7	81.3	70.8	69.6	80.3	79.3	85.2	83.2
Gross margin	18.4	18.3	18.7	29.2	30.4	19.7	20.7	14.8	16.8
All other expenses	16.1	15.7	13.4	23.8	26.7	16.7	14.7	9.8	13.9
Net income	2.3	2.6	5.3	5.4	3.7	3.0	6.0	5.0	2.9

	Oyster canner	F & F clam	Clam canner
	M	M	M
Net Sales	100	100	100
Cost of goods sold (Product related expenses)	84.7	84.3	85.0
Gross margin	15.3	15.7	15.0
All other expenses	10.3	10.8	10.6
Net income	5.0	4.9	4.4

III. PRICING

The total and per capita U. S. processed fish consumptions for all industry segments have risen gradually since 1955, when the per capita rate was 10.5 pounds, to 12.2 pounds in 1972. This 16.2 percent rise occurred while the total domestic catch declined; consequently, in order to meet the rising demand, the industry increased its imports from 1,332 million pounds in 1955 to 3,582 million pounds in 1972. Since there was no significant increase in world production, the competition for available supplies, particularly for such items as shrimp, crab, tuna, halibut, cod and salmon increased throughout the world. The growth in demand and various supply limitations, notably for fish meal and salmon, resulted in record prices.

Industry sources believe that the further prospects for continued rising prices, the availability of substitute products, and the industry's intense competition greatly militate against the possibility of the industry's being able to pass though the additional costs of pollution controls.

The objective of this chapter is twofold: it will discuss industry price determination and the basic factors which influence potential price effects.

A. Price Determination

The prevalence of small plants and the pricing structure of the industry result in industry firms being largely unable to determine industry prices.

Only in the salmon canning segment of the industry is there any appreciable price leadership by industry firms. There, several large companies apparently exercise influence on exvessel and wholesale prices. For all other segments, industry production is largely carried on by a multiplicity of small firms which cannot exercise a similar influence.

In all segments, including fish meal, prices are a function of supply and demand. Typical is that previously noted for the fish meal industry: domestic prices have been heavily influenced by intense shortage of Peruvian anchovy supplies on the one hand and, on the other, those prices have responded to the demands of the broiler industry (See: "Menhaden Reduction," Chapter I).

Exvessel prices are established by regional auctions or markets and are sensitive to landings and plant utilization. Regional markets such as those in Boston or New Bedford serve as a guide to regional and other area buyers and provide benchmark prices. Seafood processors must, therefore, decide on a daily basis whether exvessel prices and volumes warrant plant operations. In other cases, processors establish relationships with fishing fleets to purchase the total output of a boat or fleet. Raw product demand and supply, then, help determine plant utilization rates and exvessel prices.

Wholesale prices, the industry's basic selling prices, are also determined on a daily basis for some products. Processors frequently establish informal relationships with wholesalers to assure steady markets. In many cases, this requires expanded product lines to accomodate wholesalers. Again, however, landings and demand influence prices. Cold storage units have increased the ability of many processors to hold products and to capitalize on higher offseason prices.

Thus, the industry is largely a "price taker." Demand and supply forces influence prices greatly and the prevalence of small firms in the industry largely prevents individual plants from significantly affecting those prices.

B. Potential Price Effects

Determining the effect on prices induced by pollution controls is, perhaps, the most critical and difficult part of the impact analysis. These price effects are critical, for plant and production impacts are closely related to the industry's ability to absorb or pass through additional pollution control costs. Price effects are also difficult to analyze because the data necessary for the analysis are too frequently unavailable.

A variety of techniques were used to determine the effect on prices of pollution abatement costs. The nature of the problem, the state of the data, and the number and type of factors involved dictated that the problem be approached in qualitative terms. Determining the portion of pollution abatement costs to be passed through also, by necessity, involved a considerable amount of judgment.

The market clearing equilibrium price involved the supply and demand considerations listed below. A cursory review reveals that so many demand, supply, production and structural factors were included that they cannot all be expressed quantitatively.

Demand Factors

- Substitute and competitive products
- Expected demand growth
- Foreign demand
- Captive usage
- Price elasticity of demand
- Cross elasticity of demand
- Major or dominant demand components

Supply Factors

- Capacity utilization
- Foreign competition
- Supply elasticity
- Competitive structure of the industry
- Market share distribution
- Number of producers
- Price determination
- Relative bargaining power of marketing segments
- Industry leaders
- Capital acquiring ability
- Industry profit variations
- Raw material and labor availability

Abatement Cost Factors

- Municipal sewer availability by industry segment
- Segments incurring unequal abatement costs
- Collective and cooperative treatment potentials
- Physical factors affecting abatement costs
- Exogenous factors

The potential implications for price effects of some of these considerations are indicated as follows:

Substitute Products -- Competition with substitute products will affect prices and lessen the degree to which control costs can be passed to the final consumer.

Capacity Utilization -- Higher industry capacity utilization will increase the possibility of cost pass through.

Demand Growth -- A rapidly expanding market will increase the possibility of pollution abatement cost pass through.

Foreign Competition -- The greater the percentage of the domestic market served by foreign producers, the less likely it is that pollution abatement costs can be passed through.

Demand Elasticity -- The more inelastic the demand, the more likely it is that costs can be passed through.

Captive Usage -- Captive usage or fixed consumption will tend to increase the amount of costs that can be passed through to the final consumer.

Abatement Cost Differences -- Differences in control costs within the industry will adversely affect the more costly plants' ability to pass their costs through.

Basis for Competition -- If industry competition is based primarily on price as opposed to service, technology, or product brand, cost pass through will be more difficult.

Market Share Distribution -- Segments with few concentrated producers (frequently associated with price leaders) will have a greater possibility of passing through the increased costs associated with pollution abatement standards.

Relative Bargaining Power -- The relative bargaining power of individual marketing or producing segments will influence the possibilities for cost pass through. If the producers are the dominant bargaining force, cost increases may be passed backwards and forwards.

Physical Factors -- Physical factors affecting abatement costs would include temperature (Alaska vs. Florida), humidity, topography and related land - climate conditions.

Exogenous Factors -- If non-industry influences (i.e., land zoning regulations, traffic patterns, and plant locations) significantly affect plants, their control costs can be prohibitory.

It must be recognized that the price effects depend upon the number of closures, and that the number of closures depends upon the expected price effects. This simultaneous relationship is not surprising in view of the fact that any discussion of market clearing price must incorporate both demand and supply considerations.

The above is a broad overview of price considerations. This portion of the methodology was integrated with the impact methodology in the following chapter. The actual price estimates and calculations are presented in the impact chapter.

IV. ECONOMIC IMPACT METHODOLOGY

A variety of analytical procedures (i.e., discounted cash flow and break-even analysis) were used to determine the economic impacts of effluent limitation guidelines. Conceptually, all methods would produce nearly identical results; realistically, however, data availability was a requisite consideration in selecting the methodologies employed.

The economic study contractor secured data on virtually all seafood processing plants that included (1) an accurate list of all seafood processing plants excluding duplication, (2) an identification of primary product as opposed to specialty product processors, and (3) a delineation of industry plants on the basis of their sales and their specific product lines. Such data allowed the contractor to use a return-on-sales framework for the impact analysis. Profitability measures and model plant data were used to assess the severity of the impacts.

A. Fundamental Methodology

The impact methodology consisted of five basic parts:

1. Industry Segmentation
2. Pollution Abatement Cost Conversion
3. Preliminary Impact Computation
4. Price Effect Estimation
5. Plant Closure Estimation

1. Industry Segmentation: The impact analysis considered only primary processing seafood plants where the production of any one of the species considered in this study constituted on the basis of sales at least 80 percent of production. Annual production data and the length of operating season and peak production data (as indicated by the EPA) permitted the classification of all plants on the basis of estimated raw product tons per day capacities.

The economic contractor recognized that the 80 percent of production classification, though necessary under this study's limitations, cannot adequately reflect the pollution control requirements that are considered for multi-product plants; however, the analysis reflected the specie-by-specie basis of the effluent control guidelines.

2. Pollution Abatement Cost Conversion: The EPA's pollution cost estimates were adjusted for each size and segment of model plants. The costs included capital, operating, and maintenance costs, but they exclude the land acquisition costs for abatement systems which require additional land (i.e. lagoons).

All applicable costs, including those for principal and interest payments on required capital for a ten-year period at 8 percent (other interest e.g., 9 percent and 10 percent were computed also) were expressed on an annualized basis and then totaled to indicate those at each level of treatment for each plant.

(Obviously, fluctuating interest rates, inflation, and rising production costs may substantially change over time and, to that extent, this study's estimates may vary from actual costs. Too, increases in final product prices and technological advances may offset, in part, the projected effluent treatment cost increases.)

3. Preliminary Impact Computation: Preliminary impacts were computed by expressing total annualized cost of pollution abatement as a percent of sales. This calculation provided only a rough estimate of the magnitude of the required expenditures (annualized) relative to total plant sales.

Industry or segment profitability measures (based on the model plants presented in Chapter II) were utilized to determine the number of closures. Differences in processing and profitability were accounted for by utilizing profitability ranges and sensitivity analysis. The final impacts were determined by relating total annualized costs of pollution abatement control to sales and to profitability measures as presented in Chapter II.

4. Price Effect Estimation: The economic contractor examined the pricing structure of the industry, the availability and source of raw product supplies, the strength of product demand, the availability and demand for substitute and complimentary products, product price elasticities, and the magnitude of the pollution control costs in order to measure the potential effect on product prices for each segment model plant. The analysis assumed that the effects on prices were approximately equal to the pollution costs incurred by the largest producers within each segment as tempered by other market forces, e.g. foreign competition. Where several large plants were clustered together, a weighted average was used to determine price effects.

Estimating price effects, necessary to the eventual estimation of plant closures, was made difficult also by the fact that the two conditions are casually inter-related: as price effects necessitate plant closures, these closures, by affecting industry production, in turn, further effect prices.

5. Plant Closure Estimation: The final step in the analysis was that of estimating the number of plants that will not be able to withstand the net (after price increases) impacts of pollution abatement standards. This step related profitability levels before the imposition of controls with profitability estimates after imposing controls.

This step involved considerable judgment, for many quantitative factors were considered:

1. Salvage value of the plant
2. Book value of plant
3. Alternative employment options available to owners and managers
4. Age of plants
5. Other constraints such as impending action by OSHA, FDA, etc.
6. Factors such as labor availability, expected industry trends, alternative seasonal or part-time employment, land availability, required modernization, and age of owner
7. Capital acquiring ability

Community impacts, employment effects and balance of trade impacts were explored after plant closures were estimated.

The impact analysis methodology employed as many quantitative measures as were possible. Doubtless, however, the decision to close a plant seldom depends upon only one or even several such factors; thus, it is desirable to net out all factors and consider the effect of each influence separately. The complication encountered is that by doing so, the sum of the parts will not necessarily equal the total. For example, the influence of OSHA, FDA, NMFS, EPA, lack of available labor, and required modernization may not individually be sufficiently important to close a plant. When considered jointly, however, the total impact of these factors may be catastrophic. (On the other hand, it is not realistic to assume that all production cost increases are a direct result of effluent guidelines.)

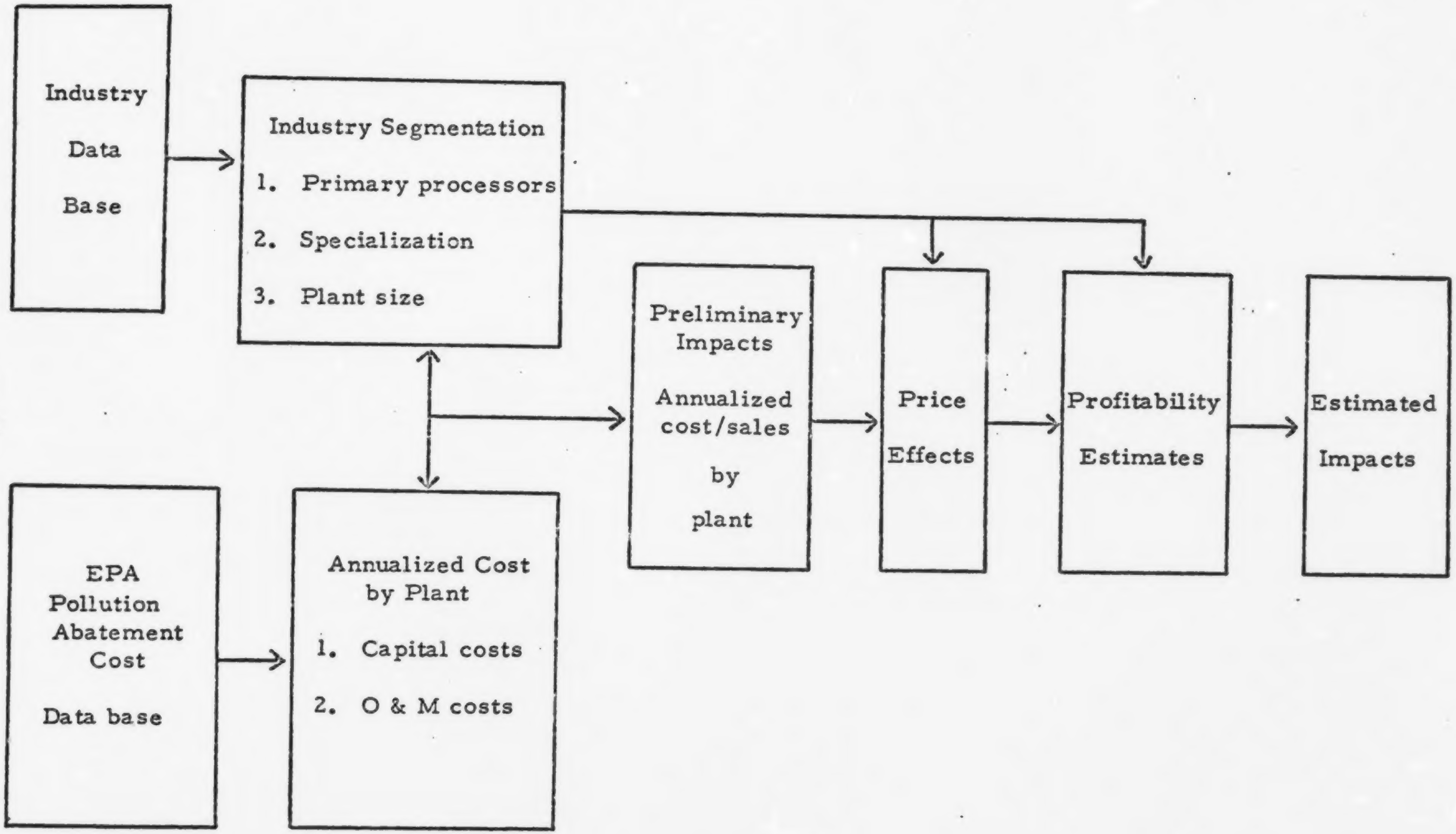
An additional complication is that it is difficult to define "acceptable" profit levels. The point at which profit levels become unacceptable varies by individual operator or owner and is influenced by other available employment options. It is relatively easy to locate small seafood processors whose returns would be insufficient for others, but it must be realized that the owner's labor is often included in normal production costs and the apparent profit is income over and above payments to family labor. Too, the large number of old,small, and run-down processing plants may be viewed as the result of poor profitability and not necessarily the cause of poor financial performance.

In other words, many factors influence the closure decision of plants and not all of these factors can be conveniently expressed in quantitative terms. Judgment, by necessity, must enter the analysis.

Insofar as possible, the estimated number of plant closures was based on only the impacts of pollution abatement standards.

A schematic presentation of the above impact analysis methodology is presented in Figure IV-1.

Figure IV-1. Impact methodology -- Summary


Industry
Data
Base
Industry Segmentation
1. Primary processors
2. Specialization
3. Plant size
EPA
Pollution
Abatement
Cost
Data base
Annualized Cost
by Plant
1. Capital costs
2. O & M costs
Preliminary
Impacts
Annualized
cost/sales
by
plant
Price
Effects
Profitability
Estimates
Estimated
Impacts

V. EFFLUENT CONTROL COSTS

The water pollution control costs used in this analysis were furnished by the Effluent Guidelines Division of the Environmental Protection Agency and were adapted to the types and sizes of plants specified in the analysis.

Three effluent control levels were considered:

BPT	-	Best Practicable Control Technology Currently Available, to be achieved by July 1, 1977
BAT	-	Best Available Control Technology Economically Achievable, to be achieved by July 1, 1983.
NSPS	-	New Source Performance Standards, apply to any source for which construction starts after the publication of the standards.

A. Description of Effluent Control Levels and Costs

The technical document describing the technology for achieving the BPT, BAT and NSPS guidelines is entitled "Development Document for Effluent Limitation Guidelines and Standards of Performance--Canned and Preserved Fish and Seafoods Processing Industry", August, 1975. To avoid duplication and possible confusion, no details or technical descriptions of BPT, BAT and NSPS guidelines are given in the present study. (The abatement technology descriptions and a complete breakdown of costs for individual components are contained in the "Development Document.")

The proposed technologies and the capital and operating costs necessary for them are shown in Table V-1. All costs are extrapolated to fit actual plant sizes. Further, land acquisition costs for technologies that require land have not been included. Normal land preparation costs for technologies requiring land were, however, included in the respective cost estimates.

All treatment system costs are in terms of 1971 dollars, and it was, therefore, necessary to up-date these to 1972 dollars by the use of appropriate cost inflators, i.e., Index of Sewage Treatment Plant Construction Costs for Investment and the Implicit Price Inflator for GNP for operating costs.

Table V-1. Effluent control costs, seafood processing plants, 1972 1/

Product category	Industry coverage	Proposed effluent treatment 2/ technology		Capital costs 3/			Daily operating and maintenance cost		
Fish meal with solubles plant	No size cut-off specified	Level I	Housekeeping	No cost involved except for housekeeping practices					
		Level II	Housekeeping	No cost involved except for housekeeping practices					
Fish meal without solubles plant	No size cut-off specified	Level I	Housekeeping with barging		49 TPD 38,000 4/				
		Level II	Solubles plant	200 TPD 225,000		100 TPD 35,000	200 TPD 200		100 TPD 130
Alaskan fresh and frozen salmon (non-remote)	No size cut-off specified	Level I	Screening with barging	53 TPD 78,600		13 TPD 55,900	53 TPD 192		13 TPD 164
		Level II	Screening, air flotation with barging	174,200		109,200	209		180
Alaskan fresh and frozen salmon (remote)	No size cut-off specified			53 TPD		13 TPD	53 TPD		13 TPD
		Level I	Grinding	31,000		24,000	47		43
		Level II	Screening with barging	78,600		55,900	192		164
Alaskan salmon canning (non-remote)	No size cut-off specified	Level I	Screening with barging	150 TPD 146,000		90 TPD 119,950	150 TPD 443	90 TPD 366	20 TPD 236
		Level II	Screening, air flotation with barging	647,000		449,000	568	453	260
Alaskan salmon canning (remote)	No size cut-off specified			150 TPD		90 TPD	150 TPD	90 TPD	20 TPD
		Level I	Grinding	54,000		45,000	97	87	69
		Level II	Screening with barging	146,000		119,950	443	366	236
West Coast fresh and frozen salmon	No size cut-off specified			35 TPD		11 TPD	35 TPD		11 TPD
		Level I	Screening	16,000		11,000	5		3
		Level II	Screening, air flotation	62,000		41,000	23		13
West Coast salmon canning	No size cut-off specified			40 TPD		15 TPD	40 TPD		15 TPD
		Level I	Screening	35,000		22,000	8		5
		Level II	Screening, air flotation	157,000		90,000	46		27
Alaskan Bottom fish	No size cut-off specified			106 TPD		14 TPD	106 TPD		14 TPD
		Level I	Grinding	38,000		20,000	63		54
		Level II	Screening, with barging	98,040		58,000	188		150
Non-Alaskan Bottom fish (Conventional)	>4,000 lbs product			43 TPD	23 TPD	10 TPD	43 TPD	23 TPD	10 TPD
		Level I	Screening	19,000	17,000	12,000	6	5	4
		Level II	Screening aerated lagoon	53,000	46,000	28,000	13	11	9
Non-Alaskan Bottom fish (Mechanical)	No size cut-off specified			49 TPD		8 TPD	49 TPD		8 TPD
		Level I	Screening	24,000		16	6		5
		Level II	Screening, air flotation	104,000		63	30		19

Continued . . .

Table V-1 (continued)

Product category	Industry coverage	Proposed effluent treatment 2/ technology		Capital costs 3/			Daily operating and maintenance cost		
Clams (conventional)	>4,000 lbs product			46 TPD		27 TPD	46 TPD		27 TPD
		Level I	Screening	21,000		18,000	5		5
		Level II	Screening	21,000		18,000	5		5
Clams (mechanical)	No size cut-off specified			265 TPD		78 TPD	265 TPD		78 TPD
		Level I	Screening	66,000		29,000	13		7
		Level II	Screening, aerated lagoon	120,000		62,000	33		16
West Coast hand shucked oysters	>1,000 lbs product			3.2 TPD	1.6 TPD	.8 TPD	3.2 TPD	1.6 TPD	.8 TPD
		Level I	Screening	20,000	16,000	8,000	5	5	4
		Level II	Screening	20,000	16,000	8,000	5	5	4
Eastern hand shucked oysters	>1,000 lbs product				1.6 TPD			1.6 TPD	
		Level I	Screening		11,000			4	
		Level II	Screening		11,000			4	
Steamed or canned oysters	No size cut-off specified				7 TPD			7 TPD	
		Level I	Screening		26,000			6	
		Level II	Screening, aerated lagoon		56,000			14	
Maine sardine	No size cut-off specified			66 TPD	44 TPD	17 TPD	66 TPD	44 TPD	17 TPD
		Level I	Screening, with grease trap for pre-cooked water	31,300		19,350	40		18
		Level II	Screening, air flotation	87,300		45,350	53		28
Alaskan scallops (non-remote)	No size cut-off specified				20 TPD				20 TPD
		Level I	Screening, with barging		82,000				61
		Level II	Screening, with barging		82,000				61
Alaskan scallops (remote)	No size cut-off specified				20 TPD				20 TPD
		Level I	Grinding		45,000				23
		Level II	Screening, with barging		82,000				61
Non-Alaskan scallops	No size cut-off specified				20 TPD				20 TPD
		Level I	Screening		17,000				1
		Level II	Screening		17,000				1
Alaskan Herring Fillets (non-remote)	No size cut-off specified				179 TPD				179 TPD
		Level I	Screening, with barging		178,600				358
		Level II	Screening, air flotation, with barging		849,600				432
Alaskan Herring Fillets (remote)	No size cut-off specified				179 TPD				179 TPD
		Level I	Grinding		51,000				70
		Level II	Screening, with barging		178,600				358
Non-Alaskan Herring filleting	No size cut-off specified				179 TPD				179 TPD
		Level I	Screening, air flotation		313,000				86
		Level II	Screening, air flotation		313,000				86
Abalone	No size cut-off specified				7 TPD				7 TPD
		Level I	Screening		7,000				3
		Level II	Screening		7,000				3

Table V-1 (continued)

1/ Source: Effluent Guidelines Division, Environmental Protection Agency, from materials developed by Environmental Associates, Inc., 1974 cost adjusted to 1972 levels by DPRA by applying appropriate cost adjusting factors. Costs are also scaled to reflect appropriate plant sizes.

2/ Level I refers to Best Practicable Technology (1977); Level II refers to Best Available Technology (1983).

3/ Cost of Level I starting from no control. Does not include land acquistion costs. Plant size represents estimated peak capacity in tons raw product per day.

4/ Barging costs for fish meal plants without solubles plants is expressed in annual costs only.

B. Current Status of Effluent Control in the Industry

For the purposes of this study, plants may be considered to use one of two major effluent technologies: they may discharge their effluents into municipal wastewater treatment systems; or, they may discharge them into open waters ("end of pipe" discharge) with or without the screening of solids.

Although only "direct" dischargers' costs are analyzed in this study, plants utilizing municipal systems do affect the industry, for their waste treatment costs are also ultimately an influence over industry prices. Generally, municipal treatment hook-up and user fees are less than the costs of privately owned facilities, but such fees vary so widely among communities that their impacts were not considered. Too, such systems are not always utilized: occasionally their fees are ultimately greater than private system costs and, at times, their use has been denied to industry plants. The proportion of industry plants on such systems was reported in the "Development Document" and is shown in Table V-2.

Direct discharge plants release their effluence through outlet pipes. At times, the effluents are ground before being discharged and, at other times, the effluents are screened to remove the solids which are then disposed of in land fills or, in a few cases, processed into animal feeds, pet foods, or fertilizers. The estimates of plants using screens are also presented in Table V-2.

The estimates of percent of plants on municipal systems and the percent of plants with screening currently in place (presented in Table V-2) were used in the analysis. For segments that do not appear in Table V-2, it was assumed that all were direct dischargers. Using this data and the economic contractor's knowledge of the industry, the percent of direct dischargers for BPT and BAT was estimated as presented in Table V-3.

Table V-2. Industrial waste treatment model data--
Estimated percent treatment existing for each subcategory

Subcategory	No. of Plants	Existing % Municipal	Treatment % Screen
Fish meal			
w/solubles plant	20	20	N.A.
w/o solubles plant	10	60	80
Salmon canning	*	30	50
F/F salmon process	*	25	0
Bottom fish process	*	35	20
Sardine canning	17	15	80
Herring filleting	7	15	15
Clam			
mechanical	27	30	5
conventional	7	0	0
Oyster			
steamed	48	0	0
conventional	27	0	0
Scallop	*	0	20
Abalone	20	80	65

Note: * indicates all plants that exceed 20 in number; N.A. means it was not necessary to screen since solids were removed prior to discharge.

Source: "Development Document for Effluent Limitation Guidelines and Standards of Performance -- Supplement A, Canned and Preserved Fish and Seafood Processing Industry," August, 1975.

Table V-3. Industrial waste treatment model data--Percent Direct Dischargers 1/

Segment	% of Plants Direct Dischargers requiring BPT	% of Plants Direct Dischargers requiring BAT
Bottom fish (Conventional)	65	65
Bottom fish (Mechanized)	65	65
Clams Fresh and Frozen (Conventional)	100	100
Clams Fresh and Frozen (Mechanized	65	70
Eastern Oysters Canned	100	100
Eastern Oysters Fresh and Frozen	100	100
West Coast Oysters Fresh and Frozen	100	100
West Coast Canned Salmon	20	70
West Coast Fresh and Frozen Salmon	0	100
Maine Sardines	62	87
Fish Meal (w/solubules)	80	80
Fish Meal (w/o solubules)	20	40
Alaskan Salmon Canning	100	100
Alaskan Bottom fish	100	100
Abalone	20	20
Herring Fillets	70	85
Scallops, non-Alaskan	80	80

Source: Based on Table V-2 and additional data estimates by the economic contractor.

VI. IMPACT ANALYSIS

The imposition of effluent controls on the seafood processing industry will have both direct and indirect impacts on the industry, on consumers, on its suppliers and on communities in which plants are located. An analysis was made, for specified effluent control technologies in both quantitative and qualitative terms.

The following types of impacts were considered.

Price effects
Financial Effects
Production Effects
Employment Effects
Community Effects
Balance-of-Trade Effects

A. Total Investment Required under BPT and BAT

Table VI-1 shows the estimated total investment costs required for BPT guidelines. These estimated costs were calculated on a plant-by-plant basis and then aggregated for each segment and for the nation. The BPT estimates do not include those plants that are on municipal systems or currently have screening "in place". The total investment for BPT is $5,541,000.

Table VI-1 shows total investment for BAT guidelines also. They exclude only those plants on municipal systems. Total investment for BPT + BAT was $11,157,000.

Annual costs, including debt service, operation and maintenance for BPT and BPT + BAT is $1,160,000 and $2,495,000, respectively.

B. Price Effects

The role of price effects in this analysis is critical. The industry is one with a relatively low value added and low profit margin in relation to sales; hence, a small change in the wholesale price while raw product prices stay constant results in significant changes in industry profits. If an increase in processor margins results from mandatory effluent treatment practices, the adverse economic impacts of those controls on the industry will be substantially off-set.

Table VI-1. Estimated total investment and annual cost of BPT and BAT effluent limitation guidelines

Segment	No. of plants	Plants above cut-off	% plants [1] direct dischargers requiring BPT	% plants [1] direct dischargers requiring BAT	BPT		BPT + BAT		Range for annual costs as % of sales	
					Invest	Annual[2]	Invest	Annual[2]	BPT	BPT+BAT
					$	$	$	$		
Fish Meal (w solubles)	16	16	80	80	0	0	0	0	None	None
Fish Meal (w/o [3] solubles)	6	6	20	40	0	0	0	0	None	None
Alaskan Fresh & Frozen Salmon (non-remote)	7	7	100	100	216,400	68,800	450,500	107,300	.8-11.3	1.4-15.9
Alaskan Fresh & Frozen Salmon (remote)	24	24	100	100	380,400	100,500	620,500	202,400	.2-4.1	.8-11.3
Alaskan Salmon Canning (Non-remote)	9	9	100	100	393,700	96,500	473,500	84,600	.7-16.9	2.4-20.0
Alaskan Salmon Canning (Remote)	50	50	100	100	2,132,600	426,000	5,308,300	1,274,100	.2- 2.8	.6- 5.8
West Coast Fresh and Frozen Salmon	1	1	0	100	0	0	28,700	5,000	None	1.3
West Coast Canned Salmon	9	9	20	70	31,700	5,200	401,400	67,000	.3- 1.2	1.2 - 4.1

Table VI-1. cont.

Segment	No. of plants	Plants above cut-off	% plants[1] direct dischargers requiring BPT	% plants[1] direct dischargers disquiring BAT	BPT		BPT + BAT		Range for annual costs as % of sales	
					Invest $	Annual[2] $	Invest $	Annual[2] $	BPT	BPT+BAT
Alaskan Bottomfish[4]	1	1	100	100	0	0	0	0	None	None
Bottom Fish (Conventional)	128	59	65	65	307,200	61,500	575,300	116,000	.1-2.1	.2-4.2
Bottom Fish (Mechanized)	14	14	65	65	206,700	37,600	758,600	135,000	.1-.4	.4-1.7
Clams Fresh and Frozen (Conventional)	60	20	100	100	183,400	37,500	183,400	37,500	.3-1.8	.3-1.8
Clams Fresh and Frozen (Mechanized)	7	7	65	70	113,000	20,900	267,200	49,600	.5-.6	.9-1.3
West Coast Oysters Fresh and Frozen	32	18	100	100	182,800	34,100	182,800	34,100	1.0-1.6	1.0-1.6
Eastern Oysters Fresh and Frozen	338	109	100	100	814,600	163,800	814,600	163,800	.4-1.0	.4-1.0
Eastern Oysters Canned	4	4	100	100	45,700	7,600	98,300	16,600	.5-.8	1.0-1.7
Maine Sardines	16	16	62	87	240,000	53,200	700,400	155,500	.3-3.7	.7-9.8

Table VI-1.cont.

Segment	No. of plants	Plants above cut-off	% plants [1/] direct dis-chargers re-quiring BPT	% plants [1/] direct dis-chargers re-quiring BAT	BPT		BPT + BAT		Range for annual costs as % pf sales	
					Invest	Annual [2/]	Invest	Annual [2/]	BPT	BPT+BAT
					$	$	$	$		
Alaskan Scallops	1	1	100	100	0	0	0	0	None	None
Non-Alaskan Scallops	5	5	80	80	9,600	1,500	9,600	1,500	.1-56.0	.1-56.0
Herring fillets	2	2	70	85	280,900	44,800	280,900	44,800	3.6-18.9	3.6-18.9
Abalone	5	5	20	20	2,600	500	2,600	500	.2-1.0	.2-1.0
Total					5,541,300	1,160,000	11,156,600	2,495,300		

[1/] Source: Development Document for Effluent Limitation Guidelines, and data estimates made by the economic contractor.

[2/] Annual cost includes operating and maintenance cost and annual cost of capital.

[3/] Closures of plants without access to a solubles plant.

[4/] Remote and non-remote costs have been averaged as locations of these plants are not known.

The extent to which price increases can be passed on depends on many factors, including most of the demand and supply considerations that were enumerated in Chapter IV. Some of these are repeated below:

1. the number of firms in the industry
2. the number of plants utilizing such generally low cost waste treatment options as municipal sewers
3. the relationship between domestic production and imports
4. the availability of substitute products
5. the competitive structure of the industry.

The competitive nature of the industry, the importance of imports, the large number of small independent plants, and the fact that processed seafoods have a limited shelf or freezer life indicate that the industry cannot demand and realize unlimited price increases necessitated by higher production costs stemming from effluent guidelines. (In some segments, processors can store products for some time, but they are then subject to additional discounts by the wholesaler.)

The industry can be nominally characterized as a "price taker". Price levels are determined by the strength of aggregate demand, existing supplies, and the prices of competitive products; thus, only modest price increases can generally be passed on to the consumers. Further, increased production costs will not result in declining exvessel prices. A general shortage in fish and other seafoods will tend to keep exvessel prices as high as the market will allow. A reduction in processor margins, therefore, will be usual in the industry in the short run.

The price increases that were utilized in the analysis were assumed to be approximately equal to the impact which would be experienced by the largest plant within each segment. In cases where several larger plants cluster at the upper end of the size spectrum, a weighted average price increase was used. In situations of directly competing segments, i.e., Alaskan salmon and West Coast salmon, a weighted average between segments was adopted. In other cases, an adjustment was made to compensate for competition from other products. In almost all segments the largest plants were only slightly impacted by the proposed guidelines; consequently, the price increases used throughout the segment's model plants were, also, small.

The exact price increase that was assumed for each segment is presented in the production effects section of this chapter. The basic assumption, i.e., that price effects were limited to the impact of the largest plant in each segment, was the most pragmatic and realistic considering the structural characteristics of the segments and the industry. The reader is encouraged to refer to Table VI-2 to review the exact price pass through that was used in the analysis.

Table VI-2. Number of plants, price effects and BPT impact by industry segment.

Segment/size	Total no. of plants	No. of plants	Estimated precontrol profitability level	Total annualized pollution abatement costs	Assumed price pass through	Net impact (cost as % of sales)	Estimated closures attributed to BPT
		above cut-off	(% of ROS)	(% of sales)			
Fish meal with solubles	(16)	No cost involved except for housekeeping practices.					
Fish meal without solubles	(6)						
> 40-150 TPD		2	3.0	17.00	0.0	17.00	None
> 150 TPD		4	3.0	10.20		10.20	1/
Alaskan Fresh and Frozen Salmon (non-remote)							
< 10 TPD	(7)	3	4.4	8.3		7.90	3
> 10-20 TPD		2	6.6	1.9	.4	1.50	1
> 20 TPD		2	6.6	.8		.40	None
Alaskan Fresh and Frozen Salmon (Remote)	(24)		4.4				
< 10 TPD		14	6.6	2.95		2.55	8
> 10-20 TPD		7	6.6	.65	.4	.25	None
> 20 TPD		3		.25		No impact	None
Alaskan Salmon Canning (non-remote)							
<50 TPD	(9)	8	4.8	3.90		3.60	3
>50 TPD		1	5.6	.70	.3	.40	None

Table VI-2. cont.

Segment/size	Total no. of plants	No. of plants	Estimated precontrol profitability level	Total annualized pollution abatement costs	Assumed price pass through	Net impact (cost as % of sales)	Estimated closures attributed to BPT
		above cut-off	(% of ROS)	(% of sales)			
Alaskan Salmon Canning (remote)							
< 42 TPD	(50)	13	2.8	1.40		1.10	6
> 42-111 TPD		17	4.5	.40	.3	.10	None
> 111 TPD		20	4.9	.25		No Impact	None
West Coast Fresh and Frozen Salmon	(1)						
4 TPD		1	5.5	.4	.4	No Impact	None
West Coast Salmon Canning	(9)						
< 15 TPD		3	4.6	.75		.45	None
> 15 TPD		4	7.4	.30	.3	No Impact	None
Alaskan Bottom Fish	(1)	1	2.6	13.20	.3	12.90	1
Bottom fish (Conventional)	(128)						
> 2-5 TPD		30	2.6	.80		.50	5
> 5-15 TPD		24	2.7	.50	.3	.20	None
> 15-30 TPD		5	4.0	.30		No Impact	None
Bottom Fish (Mechanical)	(14)						
> 24-35 TPD		8	4.0	.30		No Impact	None
> 35 TPD		6	4.0	.30	.3	No Impact	None

Table VI-2 .cont.

Segment/size	Total no. of plants	No. of plants	Estimated precontrol profitability level	Total annualized pollution abatement costs	Assumed price pass through	Net impact (cost as % of sales)	Estimated closures attributed to BPT
		above cut-off	(% of ROS)	(% of sales)			
Clams Fresh and Frozen (Conventional)	(60)						
> 2-15 TPD		12	4.9	1.55	.3	1.25	4
> 15-40 TPD		7	4.9	1.05		.75	2
> 40 TPD		1	4.9	.60		.3	None
Clams Fresh and Frozen (Mechanical)	(7)						
>40 TPD		7	4.9	.50	.3	.20	None
West Coast Oysters fresh and frozen	(32)						
>.5 - 2 TPD		12	5.0	1.90	1.0	.90	3
> 2 - 3 TPD		3	5.0	1.70		.70	1
> 3 TPD		3	5.0	1.10		.10	None
Eastern Oysters fresh and frozen	(338)						
> .5 - 1 TPD		67	2.9	.75	.5	.25	None
> 1 - 2 TPD		36	2.9	.60		.10	None
> 2 TPD		6	2.9	.50		No Impact	None
Eastern Oysters canned	(4)						
< 1.75		2	5.0	.75	.5	.25	None
> 1.75		2	5.0	.50		No Impact	None

Table VI-2.cont.

Segment/size	Total no. of plants	No. of plants	Estimated precontrol profitability level	Total annualized pollution abatement costs	Assumed price pass through	Net impact (cost as % of sales)	Estimated closures attributed to BPT
		above cut-off	(% of ROS)	(% of sales)			
Maine Sardine	(16)						
< 40 TPD		6	2.70	1.10)		.90	1
> 40 - 60 TPD		7	2.70	.40) ----	.2	.20	None
> 60 TPD		3	1.85	.35)		.15	None
Alaskan Scallops	(1)	1	No cost involved except for housekeeping practices				
Non-Alaskan Scallops	(5)						
< .5 TPD		5	3.00	2.10) ----	.2	1.90	2
Herring fillets	(2)						
4.5 TPD		1	5.0	18.90)		15.30	1
149 TPD		1	5.0	3.60) ----	3.6	No Impact	None
Abalone	(5)						
< 5 TPD		5	3.0	.45) ----	.4	.05	None

1/ Closures of all plants without access to solubles plants.

C. Financial Effects

The financial profiles for the relevant portions of the seafood processing industry were presented in Chapter II. Basic industry information and data revealed that there are great disparities in profit rates, production practices, prevailing technologies and the expected future profitability within and among all industry segments.

Specific plant financial data also indicated that many plants and industry segments operate on a day-to-day basis influenced primarily by the availability of raw product. Detailed raw product costs and production and financial data are frequently considered incidental to raw product availability. Variations in raw product availability and the failure of many plants to account accurately for specific production costs and financial data have, in some cases, thwarted attempts to quantify numerous inter- and intra-industry relationships. These constraints necessitated a higher degree of generalization than normally desirable. In summary, the impacts of pollution abatement standards within segments were developed by using fundamental industry relationships, profitability levels reported by knowledgeable industry representatives, published reports and derived relationships. Profitability ranges based on the model plants developed, as well as numerous industry contacts are presented in the production effects section of this chapter. Table VI-2 presents the profitability levels used in the analysis.

D. Production Effects

Of primary interest are those production impacts resulting from the implementation of BPT and BAT effluent controls, particularly potential plant closures. As discussed in Chapter IV, the methodology used is a return-on-sales framework of analysis. The analysis required that the annualized pollution abatement costs be related to industry segment profitability levels and sales and the potential plant closures be, then, determined.

The number of plant closures is "net" in that they reflect only those plants that do not discharge to municipal systems or those plants that do not have adequate waste treatment equipment in place at this time. The number of plant closures indicated represents only closures directly attributable to costs associated with the establishment of pollution control systems. Other closures, due to economic conditions, poor management, etc. as reflected by the general trend in plant numbers in these industry segments (the baseline condition), would primarily be found among very small plants below the cut-off limits specified.

1. Potential Plant Closures Under BPT Assumption

The BPT effluent limitation guidelines suggest relatively low level treatment technologies. In most segments, the small plants are impacted more severely than larger plants due to their lower profitability levels and higher per unit waste treatment costs; however, the guidelines do exempt the smallest plants.

This study examined impacts resulting from only national effluent limitation standards. No attempt was made to assess those induced by more restrictive state or local effluent limitation standards. States that pass more restrictive standards must recognize that as these are required, the economic impact may be greatly increased.

The projected price increases, profitability levels, and plant closures are presented in Table VI-2. All calculations were completed on a plant-by-plant basis and the results aggregated into multi-plant groups to prevent divulging individual plant data.

Baseline closures have not been specified. Past trends will probably continue through 1977 and 1983 and some small plants will discontinue production prior to these implementation deadlines, including, most likely, those plants that are projected to close or to be threatened by the guidelines. The number of plants estimated to close because of the guidelines is probably greater than the number that will actually close.

Fish Meal

Proposed effluent limitation guidelines for fish meal processing plants include housekeeping standards for the plants which recover effluent solids and barging for those plants that do not. Since housekeeping requirements are minor and, therefore, inexpensive, no significant impacts were projected for fish meal plants with soluble recovery.

A total of 6 (out of 22) fish meal plants currently do not recover solubles. Since there is no treatment available for stickwater, it is suggested that plants without soluble recovery barge their stickwater, recycled bailwater and washdown water to sea. Preferably, however, these plants should, when possible, direct their waste flows to a plant with soluble capability or build a solubles plant. The latter option is currently being practiced by some plants in the industry.

BPT guideline costs included those for the leasing of barges. On this basis, the annual costs were in excess of $100,000 for larger non-soluble recovery plants, and the guidelines resulted in the closing of all such fish meal processing plants. In actuality, however, not all such plants would be so severely impacted. Some plants without their own soluble recovery systems utilize those of other plants. Other plants have similar options. Industry data indicate, however, that at least one plant does not; consequently, that plant will either close or build its own recovery facility.

The closure estimate indicated in Table VI-2 may vary by one to two plants in either direction; however, industry production should not be significantly affected since remaining plants would have sufficient underutilized capacity to compensate for the closing of the one plant. It is important to note that the direct profitability of a plant is not the sole determinant of its continued operations. Some plants are integrated parts within larger processing operations. Thus, if distinct guidelines apply to separate components of a large, complex process, additional costs may be incurred in separating waste flow streams; however, the plant may have economics of scale in treatment. Too, the closing of a meal plant that is associated with a complex, integrated operation will certainly impact the entire production complex; consequently, the firm may be willing to reallocate part of the meal plant overhead costs to other divisions and, thus, keep the plant in operation.

Salmon

1. Alaskan Salmon -- Two categories were necessary for the Alaskan Salmon segment -- mechanized and hand-butchered salmon processes -- and these categories were further delineated into geographical subsets, i.e., remote and non-remote. (Remote plants are not located in major Alaskan cities or in locations where good transportation facilities exist. Non-remote plants are located in major cities, e.g. Juneau or Kodiak, in locations having good transportation services, or in areas of concentrated processing activities.) The proposed BPT guidelines for Alaskan hand-butchered, non-remote salmon processing plants include screening, and the barging of solids to sea. Hand butchered processing plants in remote locations require grinding and ocean outfall. The proposed guidelines for mechanized salmon are identical: screening and barging for non-remote, and grinding for remote Alaskan plants.

The above segmentation was difficult to deal with because one cannot readily identify a plant's process from plant lists; however, since most of the Alaskan salmon canning operations are partially mechanized, the impacts assumed mechanization. Grinding costs ranged from $30,000 for a 20 ton per day plant to $54,000 for a 150 ton per day plant respectively. Screening and barging costs varied from $72,000 to $146,000 for the same plants.

The impact analysis revealed that the remote plants will be impacted from 0.25 percent of sales to approximately 2.6 percent of sales. Only a small portion of this cost is expected to be passed on in the form of higher product prices.

After examining profitability, plant size and pollution abatement costs, the economic contractor estimated that 14 remote plants can be expected to close. Most of these plants are relatively small and represent approximately 11 percent of the production of all remote plants.

It should be noted that the profitability for the Alaskan salmon canning segment as reported in Chapter II was based on an average profitability rate over time. This was because of the high variability in salmon runs, one of the major determinants of plant profitability. Because of this variability in salmon runs which follow a 3 to 4 year cycle, the projections of profitability for the fresh and frozen salmon segment, for 1972, was also determined to be atypical. Therefore, to avoid understatement of impacts, the analysis was based on a profitability rate of 75 percent of those presented in Chapter II.

Non-remote plants (required to screen and barge) will be impacted from 0.4 percent of sales to 7.9 percent of sales. After examining profitability, sales, plant size and pollution abatement costs, the economic contractor classified 7 plants as expected closures, representing approximately 38 percent of the total production of all non-remote plants. The Alaskan Salmon segment estimates must be accepted cautiously. Too, the region's extreme variations in yearly landings, climate, and general uncertainties greatly increase the difficulty of quantifying plant closure data. Furthermore, the industry is most concerned with the problems attendant on solids disposal. Alaska's climate and topography may well necessitate abnormally high disposal costs which, added to other control costs, could increase plant closures. (These constraints are further considered in Chapter VII.) It may well be that this segment should be examined on a plant-by-plant basis subsequent to the determination of specific location disposal requirements.

In general, there are many factors (mostly nonquantifiable) that may influence actual plant closures. These factors must be assessed on a plant-by-plant basis. The best approach may, therefore, be to develop a procedure under which the specific waste treatment requirements reflect the unique constraints of individual plants.

2. West Coast Salmon -- The guidelines are entitled West Coast hand-butchered and West Coast mechanized salmon. These categories include a total of 10 plants that meet the 80 percent criteria as discussed in Chapter I. The impacts were computed on the basis of the mechanized costs, for most plants are partially mechanized.

The profitability estimates developed in Chapter II for West Coast salmon was based on 1972 production data, which was not representative over the long run. This high profitability was caused by a high foreign demand, for salmon in 1972 and by the high variability in salmon runs from year to year. Therefore, the analysis was based on a profitability rate of 75 percent of those presented in Chapter II.

The technical "Development Document" has estimated that 30 percent of the West Coast salmon plants are currently on municipal sewers and that 50 percent of the West Coast salmon plants have already installed screens. On this basis and since the net cost of screening is expected to be approximately $22,000 to $35,000 or about half of one percent of sales, the economic impact of effluent guidelines for the West Coast Salmon segment is very minor and no plants are projected as definite closures.

Bottom Fish

1. Alaskan Bottom Fish - The Alaskan bottom fish segment has been the topic of considerable interest in recent years. Many industry sources feel that this fish resource has great potential and will receive considerable future investment; however, presently it is not heavily utilized. Data for 1972 indicates that 14 plants processed bottom fish. Most of these plants were multispecie plants whose production was mostly devoted to salmon and/or shellfish. These data indicate that bottom fish comprised a significant portion of total production in only one plant.

The investment cost of grinding varies from $20,000 for a 14 ton plant to $38,000 for a 106 ton per day plant. Screening and barging costs vary from $58,000 for the 10-ton plant to $98,040 for the 106-ton plant. These costs were large enough to identify one plant as a BPT guideline closure.

2. Non-Alaskan Bottom Fish -- The effluent control guidelines apply to conventional and mechanized bottom fish plants located in the contiguous 48 states. This includes a total of 142 plants that meet the 80 percent specialization criteria.

Because the extent of waste water usage varies with the degree to which a plant is mechanized, this segment's plants are categorized as "mechanized" or "conventional". Unfortunately, however, checks with industry and government personnel failed to isolate any sources of data which accurately indicates the number of mechanized plants. (The difficulty is that mechanization is a continuum and not an either/or situation. Plants may use mechanized processes at a number of production stages. For example, skinning may be performed manually or by machine or the two processes could be combined in any form; thus, plants vary in the degree of the mechanization they employ and cannot be arbitrarily classified.)

Since it is impossible to accurately determine the number of mechanized plants, this study estimated the impacts by assuming that the upper ten percent (based on sales) of plants are mechanized and that the remainder utilize conventional processes. It was assumed that the larger plants are those which are mechanized.

The impact on the mechanized plants was minimal. No plants were classified as closed or threatened. The impact on the conventional plants is greater than that for the mechanized plants. The results of the analysis indicated that small plants (2-5 tons per day) will be impacted on an average of approximately 0.5 percent of sales. Plants between 5 and 15 tons per day will be impacted on an average of 0.20 percent of sales. Larger plants (greater than 15 tons per day) will experience no impact. On this basis, the economic contractor (after examining sales, profit, effluent treatment costs on a plant-by-plant basis) projected 5 small plant closures.

The impacts were substantially reduced as a result of guidelines exempting plants that produce less than 2 tons per day from the guidelines. Plants on municipal sewers were also exempt.

3. Miscellaneous Bottom Fish -- The impact of BPT guidelines on miscellaneous bottom fish are shown in Table VI-3. A total of 17 plants, both conventional and mechanized, were identified. Of these, 12 were larger than cut-off levels. Only one conventional plant was projected to close as a result of BPT guidelines. The impact on industry production is negligible since the remaining plants could process the volume lost by this closure.

Clams

The guidelines apply to both hand-shucked and mechanized clam processing. BPT guidelines require screening for all plants whose production is greater than 2 tons per day (live weight basis). All plants with less than two tons per day production are exempt from the guidelines.

Table VI-3. Estimated impacts of BPT and BAT effluent limitation guidelines for miscellaneous plants

Segment	No. of plants	Plants above cut-off	% Plants 1/ direct dis-chargers re-quiring BPT	% Plants 1/ direct dis-chargers re-quiring BAT	BPT Impacts Closures	BPT + BAT Impacts Closures
Bottom fish (Conventional)	12	7	65	65	1	2
Bottom fish (Mechanized)	5	5	65	65	0	1
Clams Fresh & Frozen (Conventional)	10	8	100	100	2	2
Clams Fresh & Frozen (Mechanized)	3	3	65	70	0	0
Eastern Oysters Fresh and Frozen	29	11	100	100	0	0
Blue Crab	16	14	80	80	0	0
Catfish	8	1	80	80	1	1
Shrimp	27	25	85	85	11	17

1/ Source: Development Document for Proposed Effluent Limitations Guidelines, and data estimates made by the economic contractor.

The analysis indicated that small plants are disproportionately impacted. Four closures were projected for the first group of hand-shucked plants above the 2 ton per day cut-off, i.e., 2 to 15 tons per day. On the average these plants will experience an impact of 1.25 percent of sales. In addition two conventional plants in the 15-45 TPD range are projected to close with a price impact of .75 percent of sales. The closing of these plants would represent a loss of 5 percent of total industry capacity.

The per unit cost of the effluent control technology decreases rapidly as the size of plant increases. The net impact for the mechanized clam segment (assumed to be the largest 10 percent of plants in the industry) is 0.20 percent of sales. This is not sufficiently large to classify the plants as potential closures.

Miscellaneous Clams

A total of 13 miscellaneous clam plants, both conventional and mechanized were identified. Of these, 11 were larger than cut-off levels. Two conventional plants were projected to close as a result of BPT guidelines (Table VI-3).

Oysters

1. West Coast, fresh and frozen - The guidelines exempt plants producing less than 0.5 tons per day, and this small plant cut-off effectively eliminates numerous small, and in some cases, inefficient, marginal plants. Screening was recommended for all categories, estimated to cost between $8,000 for an 0.8 TPD plant to $20,000 for a 3.2 TPD plant. The price impacts range from .10 percent for a greater than 3 TPD plant to .90 percent for a 0.5 - 2 TPD plant. Three closures of small (0.5 - 2 TPD) plants and one medium (2-3 TPD) plant closure were projected. The loss of production would be approximately 20 percent, but it can probably be absorbed by the remaining plants.

2. Eastern and Gulf, fresh and frozen - Of the 338 plants in this category, 109 are above cut off levels. Screening costs, for a 1.6 TPD plant, are estimated at $11,000. Price impacts were small (.10 - .25 percent), and no plant closures were projected for this segment.

3. Eastern Canned Oysters - There are only four plants identified in this category and none is exempt. Screening costs for a 7 TPD plant were estimated at $26,000. Price impacts were minor, and none of these plants is projected to close.

4. Miscellaneous Eastern Oyster Processors - These are processors for whom oysters, though constituting less than 80 percent of total volume, are, the primary species processed. Twenty-nine plants were identified and 11 were above cut-off levels (Table VI-3). All were direct dischargers. The BPT guidelines are not expected to result in any closures.

Maine Sardines

The BPT technology that was considered for the Maine sardine processing segment involved screens and grease traps. This technology is time - consuming and quite costly; therefore to avoid understating costs, the analysis assumed what some consultants felt were arbitrarily high costs: from $19,350 for a 17 TPD plant to $31,300 for a 66 TPD one. Every attempt was made to assure that all possible costs were included.

The profitability estimates developed in Chapter II for Maine sardines were based on 1972 production data, an atypical year. Landings were high and 1972 was perhaps the most profitable year in the last 10 production seasons. Again, to avoid understatement, the analysis was based on a profitability rate of 50 percent of those presented in Chapter II.

The net impact, as high as 0.9 percent of sales for plants with capacity of less than 40 tons per day, resulted in the closing of 1 plant. Production impacts will be minimal.

Scallops

The recommended control for non-Alaskan scallop plants is screening at an estimated investment of $17,000 for a 20 ton per day plant; however, these plants are small, and the investment is, thus, relatively large. Five plants were identified. The net impact of cost as a percent of sales was 1.9 percent, and two small scallop plants were estimated to close.

Herring Fillets

Only two plants were identified, one with 4.5 TPD capacity and the other, a large plant, with 149 TPD. The small plant would be heavily impacted with costs at 15.3 percent of sales and would close. The other plant would not be heavily impacted and would remain in operation.

Abalone

Five abalone processors were identified. Since only screening is required, the net impact was small, .05 percent. No abalone processors should close as a result of BPT controls.

Miscellaneous Plants

Several plants were classified as miscellaneous processors. Those whose miscellaneous production emphasizes bottomfish, clams, or oysters were considered in those segment discussions. In addition, this study also considered miscellaneous species plants whose production emphasizes blue crab, catfish, or shrimp. Briefly stated, the plant-by-plant analysis of these plants are summarized as follows:

Prices -- Blue Crab price increases were estimated to be 0.2 percent for BPT and 0.5 percent for BAT control standards. Catfish prices showed no increases. Shrimp price increases were 0.2 percent for BPT and 0.5 percent for BAT controls. Since these miscellaneous plants are but a minor part of the industry, the estimates are equal to those estimated under Phase I.

Production/Shutdown Effects -- None of the 16 blue crab processors in this segment were projected to close. Only one of the 8 catfish processors was projected to close due to BPT (or BAT). Of the 27 shrimp processors in this segment, 11 closures were estimated for BPT and 17 closures were projected under BAT control standards. Industry production will not be significantly affected since these plants are small and a large portion of supply comes from the exclusive plants covered under Phase I. The remaining plants can absorb the production losses.

E. Employment Effects

1. Distribution of Employment by Plant Size

There is a substantial concentration of employment among large firms in the seafood processing industry. Published data are not available for each segment and product category considered in this study, but industry-wide data from the Census of Manufactures indicate the situation which exists.

In the fresh and frozen packaged fish industry, in 1967, 79 percent of the plants employed less than 50 people and accounted for 29 percent of total employment; 3 percent of the plants employed over 250 people and had 34 percent of the total number of employees. Details, by plant size, are shown in Table VI-4.

In the canned, cured and preserved seafoods industry, in 1967, 75 percent of the plants employed less than 50 people and accounted for 23 percent of total employment; 3 percent of the total number of plants employed over 250 people and had 33 percent of the total number of employees. Details, by plant size, are also shown in Table VI-5.

Approximately 91 percent of the total employees in the fresh and frozen fish industry and 89 percent in the canned seafoods industry are production employees.

Table VI-4. Employment in the fresh and frozen packaged fish industry, by size group, 1967[1]

Number of employees per plant	Number of establishments	Number of employees	Average per firm
Less than 10	178	600	3.4
10 - 49	213	5,600	26.3
50 - 99	65	4,500	69.2
100 - 249	25	3,500	140.0
250 - 499	11	3,500	318.0
500 and over	6	3,800	633.0
Total	497	21,400	43.1

[1] Source: Census of Manufactures, 1967, U.S. Department of Commerce.

Table VI-5. Employment in the canned and cured seafood products industry, by size group, 1967 [1]

Number of employees per plant	Number of establishments	Number of employees	Average per firm
Less than 10	109	400	3.7
10 - 49	131	3,300	25.2
50 - 99	46	3,300	71.7
100 - 249	26	3,700	142.0
250 - 499	4	1,500	375.0
500 and over	4	3,600	900.0
Total	320	15,800	49.4

[1] Source: Census of Manufactures, 1967, U. S. Department of Commerce

2. Possibility of Reemployment in New Plants Being Built

New plants are unlikely to be built in areas where small or obsolete plants were forced to close because of their inability to add the equipment necessary to comply with water pollution control requirements. This is especially true for the Alaskan segments. It does, however, hold to varying degrees for the other segments as well.

Small seafood processing plants face substantial disadvantages due to economies of scale in processing and water pollution control operations; consequently, it is doubtful that these small plants would be replaced since the medium or large plants which survive can absorb the production of these small plants. Obsolete plants are most likely to persist in areas where the fishing and seafood processing industries are declining and, as a result, there would be little inducement to replace plants in these areas. New plants built would be in the medium-to-large size range.

3. Absorption of Laid-off Employees by Other Plants

The industry will reemploy some of the displaced workers in the medium and large plants which can bear the costs of control facilities. A few plants may increase imports of partially processed raw materials, reorganize their production lines, and concentrate on final processing. To the limited extent that this occurs, some employees would be retained. Additionally, many of the processing jobs require skilled or semi-skilled labor, and some portion of the displaced labor will be reemployed to fill those positions. Finally and importantly, though the overall industry employment numbers will not be drastically reduced as new plants come on live in different locations, it should be emphasized that many of the new positions will be taken by new employees and that a significant percentage of the unemployed workers will not be reemployed in the industry.

4. Direct Employment Effects

The plant closures estimates presented earlier (Tables VI-2 and VI-3) indicate that approximately 750 jobs will be lost as a result of BPT guidelines, and a sizeable portion of this loss will be contributed by the bottomfish, Alaskan salmon and oyster segments. Table VI-6 shows employment loss for both BPT and BAT, by segment; however, since reemployment opportunities are expected, the net loss in employment from BPT controls was estimated to be 190 jobs.

5. Secondary Unemployment Effects

The closure of seafood processing plants could result in unemployment among fishermen. The exact magnitude of these indirect effects is not known at this time; however, it should be kept in mind that the indirect

Table VI-6. Estimated direct employment loss attributed to BPT and BAT guidelines for selected segments

Segment and technology level	Total no. of plants	Total no. of employees	No. of employees jobs lost for BPT	No. of employees jobs lost for BPT+BAT
Fish meal (w solubles)	16	800	0	0
Fish meal (w/o solubles)	6	75	10	10
Alaskan Fresh and Frozen Salmon	31	820	100	300
Alaskan Salmon Canning	59	5,100	150	550
West Coast Fresh and Frozen Salmon	1	*/	0	0
West Coast Salmon Canning	9	1,680	0	160
Alaskan Bottom Fish	1	*/	*/	*/
Non-Alaskan Bottom Fish	142	5,800	220	440
Clams Fresh and Frozen	67	2,400	80	80
West Coast Oysters Fresh and Frozen	32	630	120	120
Eastern Oysters, Fresh and Frozen	338	6,000	0	0
Eastern Oysters, Canned	4	790	0	0
Maine Sardines	16	1,250	40	330
Alaskan Scallops */	1	*/	0	0
Non-Alaskan Scallops	5	45	20	20
Herring Fillets	2	270	10	10
Abalone	5	*/	0	0
Total			750	2,020
Less: Reemployment 1/			560	1,510
Net employment lost			190	510

---

*/ Data not available

1/ Due to geographic concentration of plants and their utilization of present capacity, reemployment in plants not affected is predicted for most segments, with the exceptions being remote Alaskan salmon processors and Maine sardine processors. Such employment will not always involve workers from closed plants.

effects may well be expected to exceed the direct effects. Additional indirect effects could be experienced by transportation agencies, especially air freight. As the industry adjusts to new conditions, suppliers of such materials as ice, cans, cartons, and other packing supplies associated with the seafoods industry will be variously impacted.

F. Community Effects

Direct and indirect employment losses can soon result in adverse community effects. Because the data used in the impact analysis did not include actual plant location information and firm names, the analysis could not pin-point the location of potential closures. The discussion of community effects must, therefore, be couched in a very general framework.

Although the closing of a major canner or freezer represents a substantial economic loss to any community, the impact in a major city such as Los Angeles, San Diego or Tampa, would not be as disastrous as would the closing of a much smaller plant in a location such as Kodiak, Alaska (population under 3,000) where seafood processing is the primary local industry. Although the situation in Kodiak is dramatic because of its concentration of seafood processing, its lack of alternative employment opportunities, the impact of plant closures would be equally severe in large numbers of isolated communities where the landing and processing of fish and shellfish represents a major segment of the local economy. Even considering reemployment possibilities in surviving plants, the loss of a plant in a specialized seafood processing community will adversely effect the economic base of the area.

Without knowing the exact location of plant closures, the specific communities of severe impacts cannot be designated; however, the number of concentrated plant closures indicates that adverse community impacts are most likely in Alaska, Maine and the rural areas of Chesapeake Bay.

G. Balance of Trade Effects

All other factors being equal, effluent limitation guidelines would have an adverse effect on U.S. trade balances. The increased production costs from effluent limitation guidelines will tend, ceteris paribus, to increase the competitive advantages of those foreign producers who are not subject to pollution controls. The net effect of the guidelines could result in forcing additional processing overseas.

The total value of U. S. fishery imports (edible and non-edible) reached an all time high of $1,578,700,000 in 1973, an increase of 6 percent over 1972. While a dramatic shift is not expected in 1977, domestic producers will find it increasingly difficult to compete with foreign producers. An approximately 70 percent of all seafood products consumed in the U. S. is provided by foreign processors, and increased domestic production costs will increase their competitive advantage.

The impacts of BPT standards are not great in terms of lost production; however, minor price increases are projected in all segments. It must also be remembered that EPA is not the only federal agency that has or will implement industry standards or controls which may be passed on in terms of higher prices.

The net balance of trade effects is unknown; however, the direction is obvious.

H. Impact of BAT Guidelines

The impacts from 1983 (BAT) guidelines were computed in the same manner as those for the BPT guidelines. Table VI-7 presents the number of plants, profitability levels, annualized costs as a percent of sales, assumed price pass through, net impact, the estimated number of plant closures, and the estimated number of threatened plants.

As may be expected, the higher level technology results in greater costs and a greater number of closed or threatened plants. For example, 37 Alaskan salmon plants are listed as closures. In total, 72 plants were projected as closures for the segments presented in Table VI-7.

It should be pointed out that the above numbers are net of BPT closures.

A summary of projected closures due to BAT follows:

Segment	Number of Projected BAT Closures
Fish Meal (without solubles)	None
Salmon	
1. Alaskan salmon, canning	10
2. Alaskan salmon, fresh and frozen	6
3. West Coast salmon, canning	2
Bottom Fish	
1. Conventional processing	6
2. Mechanical processing	2

Table VI-7. Number of plants, price effects and BPT + BAT impact by industry segment

Segment/size	Total no. of plants	No. of plants	Estimated precontrol profitability level	Total annualized pollution abatement costs	Assumed price pass through	Net impact (cost as % of sales)	Estimated closures attributed BPT + BAT
		above cut-off	(% of ROS)	(% of sales)			
Fish meal							
(with solubles)	(16)	No cost involved except for housekeeping practices					
(without solubles)	(6)	Solubles Plants					
40 - 150 TPD		2	3.0	7.76	0.0	7.76	None
		4	3.0	7.48		7.48	1 1/
Alaskan Fresh and Frozen Salmon (Non-Remote)							
< 10 TPD	(7)	3	4.4	11.00	.9	10.12	3
> 10 - 20 TPD		2	6.6	2.80		1.9	1
> 20 TPD		2	6.6	1.20		.3	No impact
Alaskan Fresh and Frozen Salmon (Remote)							
< 10 TPD	(24)	14	4.4	8.30	.9	7.4	14
> 10 - 20 TPD		7	6.6	1.90	.9	1.0	No impact
> 20 TPD		3	6.6	.80	.9	No impact	No impact
Alaskan Salmon Canning (Non-Remote)							
< 50 TPD	(9)	8	4.8	4.30	1.0	3.3	8
> 50 TPD		1	5.6	1.90		.9	None
Alaskan Salmon Canning (Remote)							
< 42 TPD	(50)	13	2.8	3.60	1.0	2.60	9
> 42 - 111 TPD		17	4.5	1.30		.30	2
> 111 TPD		20	4.9	.80		No impact	None

Table VI- 7. (continued)

Segment/size	Total no. of plants	No. of plants	Estimated precontrol profitability level	Total annualized pollution abatement costs	Assumed price pass through	Net impact (cost as % of sales)	Estimated closures attributed BPT + BAT
		above cut-off	(% of ROS)	(% of sales)			
West Coast Fresh and Frozen Salmon							
4 TPD	(1)	1	5.5	1.30	.9	.40	None
West Coast Salmon Canning							
< 15 TPD	(9)	3	4.6	2.80	1.0	1.80	2
> 15 TPD		4	7.4	1.25		.25	None
Alaskan Bottom Fish	(1)	1	2.6	17.00	.7	16.30	1
Bottom Fish							
(conventional)	(128)						
>2 - 5 TPD		30	2.6	1.70	.7	1.00	9
>5 - 15 TPD		24	2.7	1.00		.30	2
>15 - 30 TPD		5	4.0	.75		.05	None
(mechanical)	(14)						
>24 - 35 TPD		8	4.0	1.5	.7	.45	1
>35 TPD		6	4.0	1.10		.40	1
Clams, Fresh and Frozen							
(conventional)	(60)						
> 2 - 15 TPD		12	4.9	1.55	.3	1.25	4
>15 - 40 TPD		7	4.9	1.05		.75	2
>40 - TPD		1	4.9	.60		.30	None
(mechanical)							
>40 - TPD	(7)	7	4.9	1.10	.90	.20	None

Table VI- 7. (continued)

Segment/size	Total no. of plants	No. of plants	Estimated precontrol profitability level	Total annualized pollution abatement costs	Assumed price pass through	Net impact (cost as % of sales)	Estimated closures attributed BPT + BAT
		above cut-off	(% of ROS)	(% of sales)			
West Coast Oysters							
Fresh and Frozen	(32)						
>.5 - 2 TPD		12	5.0	1.90	1.0	.90	3
>2.0 - 3 TPD		3	5.0	1.70		.70	1
>3.0 TPD		3	5.0	1.10		.10	None
Eastern Oysters							
Canned	(4)						
< 1.75		2	5.0	1.60	1.0	.60	None
> 1.75		2	5.0	1.10		.10	None
Fresh and Frozen	(338)						
>.5 -1 TPD		67	2.9	.75	.5	.25	None
>1.0 - 2 TPD		36	2.9	.60		.10	None
>2.0 TPD		6	2.9	.50		No impact	None
Maine Sardines	(16)						
< 40 TPD		6	2.70	3.00	.5	2.50	5
> 40 - 60 TPD		7	2.70	1.10		.60	None
> 60		3	1.85	1.00		.50	None
Alaskan Scallops	(1)	1	No cost involved except for housekeeping practices.				
Non-Alaskan Scallops							
<.5 TPD	(5)	5	3.0	2.10	.2	1.90	2
Herring Fillets	(2)						
<4.5 TPD		1	5.0	18.90	3.6	15.3	1
>149 TPD		1	5.0	3.60		No impact	None
Abalone	(5)						
< 5 TPD		5	3.0	.45	.4	.05	None

1/ Closures of all plants without access to solubles plants.

Segment	Number of Projected BAT Closures
Clams	None
Oysters	
1. West Coast, fresh and frozen	None
2. Eastern and Gulf fresh and frozen	None
3. Eastern, canned	None
Sardines	4
Scallops	None
Herring fillets	None
Abalone	None
Total BAT Closures	30

Several qualifications should be stated as follows, however:

1. The structure of the industry is expected to undergo considerable change between now and 1983. Baseline closures are expected to continue. Larger, more efficient, mechanized plants are expected to increase in number and importance. Small, marginal plants will continue to face financial hardship and will subsequently, discontinue production.

2. Significant changes in water use, water efficiency and waste treatment are expected. The net effect may be a reduced per-unit waste treatment cost.

3. Increased by-product recovery (reduction and solubles plants) and greater efficiency are likely to result in more recovery facilities and greater efficiency in general.

4. The number of plants served by municipal waste treatment systems is expected to increase.

5. Developments in Alaska will change the status of some plants from remote to non-remote.

6. BAT guidelines will be reviewed before 1983.

7. Profitability levels and production costs will also change from those presented in Chapter II.

In the aggregate, the above factors will influence the accuracy of the closure estimates presented in Table VII-7.

I. Combined Impact BPT + BAT Guidelines

The combined impact of the BPT + BAT guidelines is shown in Table VI-8 and is summarized as follows:

Segment	Projected BPT + BAT Closures
Fish Meal	
1. With solubles	None
2. Without solubles	1
Salmon	
1. Alaska, canned	19
2. Alaska, fresh and frozen	18
3. West Coast, canned	2
4. West Coast, fresh and frozen	None
Bottom Fish	
1. Alaska	1
2. Continental U. S.	13
Clams	6
Oysters	
1. West Coast	4
2. Eastern and Gulf, fresh and frozen	None
3. Eastern, canned	None
Sardines	5
Scallops	2
Herring fillets	1
Abalone	None
Total BPT + BAT closures	72

J. Impact of New Source Performance Standards

New Source Performance Standards apply to any source for which construction starts after the publication of the standards. The requirements are presented below.

Table VI-8. Estimated impacts of BPT and BAT effluent limitation guidelines

Segment	No. of plants	Plants above cut-off	% Plants 1/ direct dis-chargers re-quiring BPT	% Plants 1/ direct dis-chargers re-quiring BAT	BPT Impacts Closures	BPT + BAT Impacts Closures
Fish meal						
With solubles	16	16	80	80	0	0
Without solubles	6	6	20	40	1 2/	1 2/
Salmon						
Alaskan, fresh and frozen (non-remote)	7	7	100	100	4	4
Alaskan, fresh and frozen (remote)	24	24	100	100	8	14
Alaskan, canning (non-remote)	9	9	100	100	3	8
Alaskan, canning (remote)	50	50	100	100	6	11
West Coast, fresh and frozen	1	1	0	100	0	0
West Coast, canned	9	7	20	70	0	2
Bottom fish						
Alaskan	1	1	100	100	1	1
Non-Alaskan (conventional)	128	59	65	65	5	11
Non-Alaskan (mechanized)	14	14	65	65	0	2
Clams						
Fresh and frozen (conventional)	60	20	100	100	6	6
Fresh and frozen (mechanized)	7	7	65	70	0	0

Table VI-8. (Continued)

Segment	No. of plants	Plants above cut-off	%Plants 1/ direct dis-chargers re-quiring BPT	% Plants 1/ direct dis-chargers re-quiring BAT	BPT Impacts Closures	BPT + BAT Impacts Closures
Oysters						
West Coast fresh and frozen	32	18	100	100	4	4
Eastern fresh and frozen	338	109	100	100	0	0
Eastern canned	4	4	100	100	0	0
Maine Sardines	16	16	62	87	1	5
Scallops						
Alaskan	1	1	100	100	0	0
Non-Alaskan	5	5	80	80	2	2
Herring Fillets	2	2	70	85	1	1
Abalone	5	5	20	20	0	0

1/ Source: Development Document for Effluent Limitation Guidelines, and data estimates made by the economic contractor.

2/ Closures of plants without access to a solubles plant.

Title	New Source Performance Standards
Fish meal	
With soluble retention	Housekeeping
Without soluble retention	Soluble plant
Alaskan Hand Butchered Salmon	
Non-Remote	In plant, screening, barging
Remote	In plant, grinding
Alaskan mechanized Salmon	
Non-Remote	In plant, screening, barging
Remote	In plant, grinding
West Coast Hand Butchered Salmon	In plant, screening, flotation
West Coast Mechanized Salmon	In plant, screening, flotation
Alaskan Bottom Fish	
Non-Remote	In plant, screening, barging
Remote	In plant, grinding
Non-Alaskan Convention Bottom Fish	In plant, screening, aerated lagoon
Non-Alaskan Mechanized Bottom Fish	In plant, screening, flotation
Hand-Shucked Clams	In plant, screening
Mechanized Clams	In plant, screening, aerated lagoon
West Coast Hand-Shucked Oysters	In plant, screening
East and Gulf Coast Oysters	In plant, screening
Steamed, canned oysters	In plant, screening aerated lagoon
Maine Sardines	In plant, screening, flotation
Alaskan Scallops	
Non-Remote	In plant, screening, barging
Remote	In plant, grinding

Title	New Source Performance Standards
Non-Alaskan Scallops	In plant, screening
Alaskan Herring Fillets	
Non-Remote	In plant, screening, barging
Remote	In plant, grinding
Non-Alaskan Herring Fillets	In plant, screening, flotation
Abalone	In plant, screening

For the most part, new source performance standards will not halt new investment in seafood processing facilities. Even though substantial impacts and relatively high baseline closures have been projected, new plants are planned or proposed, for the closures are predominately obsolete, inefficient production facilities that have outlived their usefulness and new facilities tend to be large, mechanized and efficient multi-specie processing units.

A deterent to new investment, however, is industry's view that government regulations offer an array of ever-present restrictions that threaten industry profitability levels; however, long-run plans and investment will be made if future requirements are clarified and not overly restrictive.

VII. LIMITS OF THE ANALYSIS

A. General Accuracy

The seafoods processing industry is complex in terms of the number, ownership, location, type and size of its plants. Variations in seasonal operations, extreme variations in climate (Kodiak, Alaska to Key West, Florida), and substantial differences in raw product characteristics all contribute to this complexity.

Published sales and volume data are generally released in aggregate form. A substantial effort was made to develop supplemental detail to simplify and to improve the accuracy of the analysis. In addition, considerable time was spent supplementing original data sources and revising critical assumptions. Even though additional time and effort were invested, a great deal of unexplained variations from plant to plant exist. Very few industries in the U. S. are more complex in terms of number and type of plants than is the seafood processing industry.

Throughout the study, an effort was made to evaluate the data available and to update these materials wherever possible. Checks were made with informed sources in both industry and government to help insure that data were reliable and representative.

Although processing cost and investment and profitability data are approximate, the general information for these measures was obtained from a substantial number of processors, and when classified and cross-checked the general data showed reasonable degrees of consistency.

Published information from the Internal Revenue Service, Standard and Poors, Dun and Bradstreet, and other sources of data on financial ratios and financial performance were also used as checks on the reasonableness of the results obtained in the impact analysis.

While the accuracy of this report has been enhanced by greater cooperation and data availability, the complexity of the problem and the data limitations are such that qualitative judgments were invariably involved. Whenever such judgment was involved, the possibility of errors increased. Such errors stemmed from a variety of sources, and collectively, they may have been additive or offsetting. Some of the major sources of possible error are enumerated below.

1. Effluent Control Costs

The water pollution control costs furnished by the EPA "Development Document" were developed for a variety of industry categories, subcategories and effluent treatment systems. It was necessary to adapt these effluent control costs to the types and sizes of plants used in this analysis, and the possibility existed that the cost extrapolation technique utilized may not have been appropriate. Most extrapolation techniques assumed smooth functions when, in fact, step functions may exist.

2. Current Effluent Treatment Status of the Industry

The assumptions concerning the current effluent treatment status of the industry were also critical to the analysis. This report, based on the recommendations of the EPA "Development Document," assumed that only limited pollution abatement equipment is currently "in place".

3. Current Status of Municipal Treatment in the Industry

Only limited information was available concerning the number, location and types of seafoods processing plants discharging into municipal sewage systems. These estimates were presented in Chapter V. Although these estimates were not based on a complete survey of all of the plants in each area and product category, the industry contacts made in each area were adequate to estimate importance of municipal waste treatment system connections to the seafood processing industry. In some situations, e.g., Astoria, Oregon and Terminal Island, California, expanded and/or improved sewage treatment facilities are either planned or actually under construction. These new facilities will relieve the situation in those locations.

4. Estimating Peak Capacity

Effluent control costs are or should be based on the peak capacity of the considered plant; however, in the seafood processing industry, plant capacity is a rather nebulous concept because plant capacity may be doubled or expanded greatly by simply adding an additional filleting table.

Peak plant capacity, as recommended by the EPA Development Document, was assumed to be thirty percent greater than average annual production.

5. Economic Status of the Industry

In addition to the above factors, much variation exists in the economic profiles of individual seafood processing plants. Throughout the report the estimated profitabilities by industry segment were broad generalizations for the entire segment. The profitability of any one plant may vary from the industry average by a factor of two or more.

6. "Shutdown" Decisions

The general purposes of the "shutdown" analysis was (1) to examine the profitability of plants before and after the imposition of effluent limitation guidelines, (2) to determine the probability of plant closures, and (3) to calculate the price changes required to cover the added effluent control costs. These required assumptions relative to numerous factors which are described in detail in previous sections of this report. Assumptions utilized were made on the basis of the best information which could be developed regarding conditions prevailing in the seafoods processing industry. The possibility of error did, however, exist.

7. Price Effects

The extent to which the seafoods industry and its specific segments can pass increased costs forward to consumers or backward to suppliers is an important factor affecting the impact which pollution control costs would have on the industry. Little information is available on demand elasticity for seafoods and even less on supply elasticity; thus, the price effects and impacts assumed were value judgments and, as such, were possible sources of error.

8. Inflationary Trends

The study used 1972 as the base year in the analysis, but a continuation of present inflationary trends will increase production and effluent treatment costs and final product prices. The net effect on processor margins can not, however, be determined at this time. For example, recent communications with blue crab industry representatives indicate that payments for labor have increased 25 percent, cans 5 percent and energy 80 percent in recent months. These increases are of great concern to the industry, and the reader is advised that these costs have not been reflected in the 1972 data used in the analysis.

B. Other Considerations

While an attempt was made to utilize all data available, several other areas and methodological procedures embodied in the report influenced its overall accuracy.

One of these stems from the fact that the analysis assumed "end of pipe" treatment. In many areas, cooperative treatment, solids, reduction, and cooperative barging will substantially reduce the actual effluent treatment cost.

At the direction of EPA, the study also assumed that the current effluent treatment status of the industry is very low. In most segments, however, one can easily locate plants with fairly advanced effluent treatment systems. Since it was assumed that the current treatment status of the industry is less than is actually in place, the projected closures may be excessive.

Still another factor which was difficult to analyze was the impact of controls on the mechanized processing segments. Unfortunately, there is no clear-cut distinction between mechanized and non-mechanized segments. Some plants may utilize machines in various processes at peak processing periods. During periods of low-plant utilization, all processes may be performed manually. In most cases, the number of mechanized and partially mechanized plants is simply not available; thus, the distinction between mechanized and conventional plants was simply not a useably accurate framework for this economic study.

In general, too, it was not always possible to analyze in detail the incremental aggregate effects of other regulatory programs (FDA, OSHA, State laws, etc.) which place specific requirements and costs on the seafoods industry.

In summary, the above material briefly discusses several factors that would increase or decrease the number of plant projected closures. Other factors not discussed could also influence the accuracy of the analysis. In general, however, it is believed that the impacts projected represent the worst or extreme situation. The actual closures may be fewer in number.

C. Selected Qualifications for Alaskan Segments

Apparently solid waste disposal in Alaska continues to be a problem for the industry. There are indications that many physical constraints to both barging and/or land fill exist. These items reappear frequently in the solid waste disposal summary presented below. Land fill and barging constraints exist and are heavily dependent upon local conditions. The following summary is intended as a description of the constraints at selected locations and they should be examined prior to 1977 and 1983.

1. Problems Associated with Land Fill Solids Disposal in Alaska

General - Land fills are governed by state law. In order to obtain and keep a state permit, a plant must meet strict conditions. Land fills must be operated in a sanitary manner at acceptable locations without contaminating state waters by seepage or leakage. Sufficient soil must be available to cover the waste materials at the end of each day's operation. The operation must not cause any esthetic or ecological damage.

None of the plants listed in this report is presently using a land fill for the disposal of seafood processing wastes. In some areas the surrounding land is not suitable for land fill; other areas where potential sites are indicated, the site conditions would have to be further investigated before a final decision for their use could be made.

Bristol Bay - The land area in Bristol Bay is at approximately sea level. It is flat and there are numerous lakes and potholes. The surface is covered with tundra with underlying permafrost. Land fills in this area would not appear to be workable because of the natural conditions and the fragile nature of the sub-arctic environment.

Kodiak Island - Plants in the city of Kodiak handle processing solids in a reduction plant and have no need for land fill. Plants on the rest of the island have potential sites, but since the island is essentially rock without much top soil there may be a problem in finding enough covering material to comply with state operating regulations.

Cook Inlet - Land filling on the Kenai Peninsula would probably be more successful than in other areas of Alaska. Potential sites are available; however, local conditions would have to be investigated, especially sandy areas, to determine whether leakage could contaminate state waters. The area's muskeg soils would cause problems.

Prince William Sound - Limited area may be possible. Much of the land is mountainous, and the flat areas are tide flats which are obviously unsuitable.

Southeastern Alaska - This region is generally mountainous behind the beach areas where the canneries are located. The terrain would make land filling difficult. The high annual rainfall may cause leakage into state waters.

Washington and Oregon - Solids are generally used in reduction plants. Land fill areas are available; however, the experience of various cities indicates that available sites are rapidly being used up.

2. General Comments on Barging Processing Waste From Seafood Plants

There are a number of critical constraints on the barging of solid seafood waste for ocean disposal. They are as follows:

a. It is not clear from applicable state and federal regulations exactly what constitutes proper disposal areas for seafood waste. If such areas are outside of three miles, barging could require round trips in excess of 200 miles in such regions as Cook Inlet.

b. In some cases, the barging of solid wastes would require the construction of new dock facilities and the purchase of barges and towing equipment. In some areas such as Bristol Bay and Cook Inlet barges would have to be of shallow draft. In other areas, such as that of the Whitney-Fidalgo plant in Petersburg, Alaska space is not available for barge docks. Too, docks, barges, and towing equipment would be used for only one to three months, (the barges and vessels would have to be stored ashore the remainder of the year) and the cost of leasing such equipment during the summer season may be prohibitive.

c. In regions with great tidal movements, such as Cook Inlet and Bristol Bay, barges can be taken out only at high tide and extra barges and dock space would be necessary to handle full barges waiting for tides. The crew expense would be quite high, for barges must be moved at high tide regardless of the hour of day or night.

d. The general weather conditions make dependable barge schedules unrealizable. Handling barges in strong tides, heavy seas, and the high winds of Alaska's unprotected areas is impossible; indeed it is probable that barges could not be towed to and dumped in the proper areas from 25 to 30 percent of the time because of the weather alone.

e. Barges berthed at the processing plants will attract insects, birds, and rodents and would, consequently, create a serious sanitation problem in the view of local, state, and federal health agencies.

3. Consideration of Alternate Plant Sites

In addition to the problems associated with landfill and barge disposal previously noted, the problems associated with moving existing seafood processing plants to other areas to provide for barge disposal, landfill, or municipal treatment are numerous.

Potential sites are limited by climate, by their proximity to fishing areas, and by their available transportation facilities. Additional limiting factors involve the seasonal fishing characteristics of various areas. Only limited areas offer adequate processing water, labor forces, transportation, and protection for plant and facilities against Alaska's weather.

A further major problem is the restriction imposed by the Native Land Claims Act (many Native Corporations have not yet selected their land) and the subsequent right of the state to land selection.

Additional considerations are presented in Table VII-1 which briefly ennumerates the solid waste disposal constraints faced by selected plants. Many of these plants are salmon processing plants as well as processors of other fish and shellfish, but they are included as representative examples of the Alaskan seafood processing industry.

In summary, many technical or physical constraints on solid waste disposal exist in Alaska. In addition, the estimated pollution abatement costs may not adequately reflect the actual costs which may be incurred, i.e., duplicate barges, etc. If the costs are understated, additional plant closures could result from the imposition of BPT guidelines.

The lack of available land and docks and the duplicate barge requirements could result in greatly inflated BPT closure estimates.

Table VII-1. Solid waste disposal summary of selected seafood processing plants in Alaska.

Company Name	Plant Location	Potential Miles to Land Fill	Acres Owned by Plant	Ownership of Surrounding Land
		BRISTOL BAY		
Whitney-Fidalgo	Naknek	Land not suitable	3	Local residents
North Pacific Processors	So. Naknek	Land not suitable	6	Local residents & City
Columbia Wards Fisheries	Ekuk	Land not suitable	6	Alaska Native Corporation
Bumble Bee Seafoods	So. Naknek	Land not suitable	5	Local residents No. Pacific Seafoods
New England Fish Co.	Pederson Point	Land not suitable	10	Other business Native Private Ownership
New England Fish Co.	Egegik	Land not suitable	1	Other business City & Private
		KODIAK ISLAND		
Whitney-Fidalgo	Kodiak	5	2	Local residents Peter Pan Seafoods
North Pacific Processors	Kodiak	5	2	Alaska Packers Kodiak Airways
Columbia Wards Fisheries	Alitak	NA	4	Federal Wildlife Reserve
Columbia Wards Fisheries	Port Bailey	NA	6	Private & State Lands
Kodiak King Crab, Inc.	Kodiak	NA	4	City, State, & other processors

NA = Not Available

Table VII-1. (continued)

Page 2

Company Name	Plant Location	Potential Miles to Land Fill	Acres Owned by Plant	Ownership of Surrounding Land
KODIAK ISLAND (Cont.)				
Kodiak King Crab, Inc.	Zachar Bay	NA	2	Native Land Claims Act
Kodiak King Crab, Inc.	Port Williams	NA	11	National Forest, Native Land Claims
New England Fish Co.	Uganik	1/4 mile	5	State & Federal
COOKS INLET				
Whitney-Fidalgo	Anchorage	17	Lease Property	Alaska Railroad
Whitney-Fidalgo	Port Graham	NA	4	Local Alaska Natives
Kenai Packers	Kenai	NA	46	Alaska Packers & Local homesteads
Columbia Wards Fisheries	Kenai	NA	55	Local homesteads
PRINCE WILLIAM SOUND				
Whitney-Fidalgo	Whittier	NA	Lease Property	Alaska Railroad
North Pacific Processors	Cordova	NA	Lease Property	City of Cordova
St. Elias Ocean Products	Cordova	NA	1	Indian Land Claims
New England Fish Co.	Orca	5 miles	7	Federal
SOUTHEASTERN ALASKA				
Whitney-Fidalgo	Ketchikan	NA	2	Union Oil Co. Local Metal Shop